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OAIP

Ontario
Assessment
Instrument
Pool

Mathematics

MEASUREMENT

JUNIOR DIVISION

Ministry of Education
Ontario

Sean Conway, Minister

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JAN 1 4 1994

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JUNIOR DIVISION MATHEMATICS: MEASUREMENT

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ONTARIO ASSESSMENT INSTRUMENT POOL
BANQUE D'INSTRUMENTS DE MESURE DE L'ONTARIO

The Ontario Assessment Instrument Pool/Banque d'instruments de mesure de l'Ontario (OAIP/BIMO) is a resource designed to assist those in education in fulfilling their responsibilities for evaluating student achievement and the effectiveness of programs in elementary and secondary schools. OAIP/BIMO consists of a large collection of questions in a variety of formats for several subject areas and grade levels. These questions are based on Ontario curriculum guidelines.

OAIP/BIMO materials are intended for use at the classroom, school, system, and provincial levels. At the classroom level, they can be used for instructional as well as assessment purposes. At all levels, their use can provide information related to student achievement for the purposes of (i) evaluating and planning improvements in educational policies and instructional programs, (ii) reporting on the effectiveness and appropriateness of existing policies and programs, and (iii) reporting on the overall progress of groups of students. OAIP/BIMO materials are designed to augment currently used evaluation strategies and tools. It is inappropriate to use them for the purpose of teacher evaluation. Public reporting of comparisons between classes or schools or school boards would also be inappropriate.

POOLS CURRENTLY AVAILABLE

OAIP	English	Intermediate Division
	Geography	Intermediate Division
	History	Intermediate Division
	Mathematics	Junior Division
	French as a Second Language	Grades 6 and 10
	Chemistry	Senior Division
	Physics	Senior Division
BIMO	Anglais	Cycle moyen
	Anglais	Cycle intermédiare
	Français	Cycle moyen
	Français	Cycle intermédiare
	Géographie	Cycle intermédiare
	Chimie	Cycle supérieur
	Physique	Cycle supérieur
	Histoire	Cycle intermédiare (available in Fall 1986)

POOLS BEING DEVELOPED

Pool	Tentative Release Date
OAC Biology	June 1988
Language Arts, Junior Division	January 1989
Mathematics, Intermediate Division (New Pool)	June 1989
Science, Intermediate Division	June 1989
English, Senior Division	June 1989
Science, Junior Division	June 1989
Mathematics, Senior Division	December 1989
Français, cycle supérieur	September 1990
Mathématique, cycle moyen	February 1987

Arrangements are being made for the development of BIMO pools for Intermediate and Senior Divisions in Mathematics and Science.

Basic level pools will also be developed for English, Mathematics, and Science and equivalent pools will be developed for BIMO.

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Jay Symington, Peel Board of Education
Robert Tappay, Simcoe County Board of Education

Special appreciation is extended to all those principals, teachers, and students who participated in the Screening Trials of the instruments prepared for this pool.

INTRODUCTION

The Ontario Assessment Instrument Pool is a collection of assessment instruments designed to serve two basic functions: to be a resource for the evaluation of programs at the provincial and local levels and to assist teachers in evaluating student achievement for both diagnostic and summative purposes. They can also be used for instructional purposes.

The instruments in the Junior Division Mathematics pool have been created to match the expectations for mathematics listed in The Formative Years, pages 11, 12. Because each expectation identifies a large amount of learning to be accomplished over the three years of the Junior Division, the expectations have been broken down into lists of specific objectives representing small steps toward the achievement levels intended for students at the end of this Division. Curriculum documents from twenty-three boards of education were reviewed during the process of creating the essential framework for the development of the instruments in this pool.

Structure of the Pool

The material in this pool has been carefully organized to parallel the mathematics outlined for the Junior Division in The Formative Years. It should be emphasized that this arrangement should not determine or even influence the order in which topics are taught. Education in the Primary and Junior Divisions makes it clear that arithmetic, measurement, and geometry should be integrated and that mathematics as a whole should be firmly linked to communication skills as children learn to represent their experiences and their thinking. This pool has been designed to make the identification and retrieval of particular instruments as simple as possible for the teacher. There are three strands - arithmetic, measurement, and geometry. Each strand is divided into two sections as illustrated in this chart:

STRAND	Arithmetic	Measurement	Geometry
SECTION	Numeration	Quantification	Configuration
	Relationships	Relationships	Relationships

The emphasis on relationships in each of the strands is a serious attempt to apply two of the most important assumptions about learning expressed in Education in the Primary and Junior Divisions - "Most human activity is a purposeful search for pattern" (page 75) and " ... (mathematical) models help children to see relationships in the environment and thus to make sense of the world about them" (page 61). Over 60 per cent of the instruments in this pool are in the sections labelled Relationships.

In addition, objectives are classified according to topic, sub-topic, and category. Pages where the instruments for a new objective begin are identified by a classification table such as this:

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Arithmetic	Numeration	Whole Numbers	Estimation	Applications

While the topics and sub-topics are unique to individual strands and sections, the category labels are common to all. Every objective is identified as being concerned with concept development (understanding), knowledge of facts and operations (skills), or applying concepts and skills in simple problems (applications). While the boundaries between these categories are not always clear, this kind of classification of the objectives will help in the choice of instruments for diagnostic purposes. Teachers are aware that concepts are formed gradually as a result of suitable experiences and discussion. Once a concept is firmly grasped it is unlikely to be forgotten but there is usually a time when it is unstable. During this period it may seem to be established in some situations and not in others. It is for this reason that we cannot look for precision in evaluating understanding and yet we cannot ignore it just because it is difficult to assess. At any one time it is much easier to determine whether or not a student knows a particular fact or can perform specific skills. This knowledge or skill diminishes without frequent real use or, at least, regular practice. Applying mathematics is one of the prime reasons for studying the subject. Where problems are noted in applications, the difficulty may be in the understanding or skills involved. For this reason, in diagnosis, it is useful to refer to instruments on the same sub-topic but under the other categories.

In addition to the classification scheme already described, most objectives are grouped in pairs to emphasize the concept of reversibility which is so critical in assessing levels of competence. For example, in the Arithmetic strand under the topic Whole Numbers, Representation, Objective 8 is "Given the expanded form of a whole number less than one million, the student will identify that number." Objective 9 follows, "Given a whole number less than one million, the student will express it in expanded form." It is important that assessment activities include instruments from each one of the pairs of objectives.

Features of the Instruments

The major purpose of the Ontario Assessment Instrument Pool is to provide teachers and administrators with a bank of good quality questions. The development of this pool has stretched over several years and involved hundreds of educators throughout Ontario. Several thousand students participated in the Screening Trials which provided data for assessing format, difficulty level, and suitability of each instrument. This process led to the removal of many questions involving the use of concrete materials since the availability of such materials could not be guaranteed because of the random selection of participating classrooms. This shortcoming of the pool must not be allowed to influence good teaching which should rely heavily on activity-based learning situations.

The instruments related to each objective may involve one of three types of stimuli and one of three modes of response. Questions may make use of objects (Concrete), representations of objects (Diagram), or descriptions of objects (Verbal), in setting the problem. Answers are to be recorded using multiple choice, a written response, or a sketch. In some cases, the same question is presented in all three formats, each requiring at least two modes of response. While over 40 per cent of the instruments in this pool are multiple choice questions, some oral questions involving concrete materials have been included as models for possible expansion of the pool by groups of teachers. The variety in instrument design adds an element of flexibility that should help teachers devise appropriate assessment activities for the different purposes that arise in every classroom.

Most instruments have answers provided. In some cases, where there is no one correct response, the range of possible answers is indicated. All of these may be easily masked when reproducing the questions for assessment purposes.

The instruments for each objective have been arranged in order of difficulty. Since difficulty is dependent upon the experience of students, this order may not be relevant in a specific class. In the final analysis, it is the teacher who is the best judge of the suitability of each instrument for students in a class.

This pool of instruments can be electronically stored or kept in printed form. A simple code has been developed to assist in identifying the types of questions and to facilitate retrieval. It is alpha-numeric with the first group of three symbols used to indicate the section, the topic, and the sub-topic. The next group consists of four digits, identifying the objective within the sub-topic and the number of the instrument relating to that objective. The final group consists of two letters, identifying the type of stimulus used (C for concrete material, D for diagram, V for verbal) and the form of the response (M for multiple choice, R for written answer, S for sketch or diagram). Thus NWE 0302 DR from the arithmetic strand can be translated as:

N - Numeration	(Section)
W - Whole Numbers	(Topic)
E - Estimation	(Sub-topic)
03 - Objective #3	(Objective/number under NWE)
02 - Instrument #2	(Instrument number related to Objective NWE 03)
D - Diagram	(Type of stimulus)
R - Written Answer	(Form of response)

Use of the Pool

It is important that this pool of instruments be considered a supplement to the resources already available to teacher; it should not be treated as the only supply of assessment materials. Direct observation of students during learning and practice activities should continue to contribute a major portion of assessment data throughout the Junior Division. Teachers who have already accumulated files of questions for specific objectives may wish to cut up these pages and add particular instruments to their own supply. Conversely, good questions in the teachers' files may be added to this pool and the code numbers and format altered to include them. In either case, the resulting collection will be a comprehensive resource for designing assessment activities to serve a wide range of purposes.

(a) Instructional Uses

The pool can be used for instructional purposes as well as assessment. The objectives developed could be compared with those used in board documents and modifications made in either or both lists. Some of the instruments may be appropriate as models for demonstration or discussion during lessons. It is important that students have some experience with the variety of formats and styles of questioning used in the pool before they encounter them in a testing situation.

(b) Survey Tests

Because most of the instruments in the pool can be answered quickly and scored easily, they are particularly useful for tests designed to cover a large amount of material. The beginning of a school year or of a new term is a good time to identify strengths and weaknesses of an entire class. Tests of this kind require a large number of instruments matching the topics or objectives that the teacher believes should have been learned before. Having identified areas of general strength or difficulty, the teacher can then alter the program to meet the needs revealed by the test results. Performance profiles of individual students can be prepared using data from survey test, usually supported by a personalized screening test using different instruments from the pool. The

results of such survey tests should not be recorded as achievement tests. The end of term or near the end of a school year are also appropriate times to use a survey test to provide data on which to base a review program or provide useful information to a new teacher.

Principals or other supervisory officials may use the pool to determine the effectiveness of the mathematics program in a number of classes or in several schools. Again, the results obtained from such surveys should be confirmed by other evidence such as direct observation of the students in the classrooms before major decisions are made.

(c) Achievement Tests

When used in conjunction with other sources, the pool has enough depth and variety of questions on each objective to permit designing tests to determine the level of pupil achievement in specified topics. Records of topic by topic achievement are of immediate value to the teacher in choosing tasks that will maintain feelings of success for each pupil. They can also be passed on to other teachers, helping them to plan work at appropriate levels.

Achievement tests on work taught over a period of time, i.e., a month, term, or year, are useful only when students are to be compared with each other, perhaps for grouping purposes, or in assessing the effectiveness of the program. Data from such tests can be used to support the teacher's judgement in communicating pupil progress to parents.

(d) Tests for Diagnostic Purposes

To obtain full value for the time spent doing any test, the teacher should always examine the results for information that can be used to benefit each student. Thus, every test or examination could be labelled diagnostic. However, current propaganda suggests that real 'diagnostic' tests unfailingly allow teachers to pinpoint difficulties and apply effective remedies. It is not that simple. Pencil and paper tests do not always reveal gaps in understanding or deficiencies in skills. The best source of data for diagnosis is direct observation of the student engaged in a mathematical activity.

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Standard Units	Understanding

Objective — Given that a certain dimension of an object (e.g., length, width, depth, height) is to be measured, the student will identify the most appropriate unit (mm, cm, m, km).

	Instrument	Correct Response
QLS 0101 VM	Which one of the following units is best used to measure the length of a thumb tack? (A) millimetre (B) centimetre (C) metre (D) kilometre ____	A
QLS 0102 VM	Which one of the following units is used to measure the height of a person? (A) millimetre (B) centimetre (C) metre (D) kilometre ____	B
QLS 0103 VM	Which one of the following units is commonly used to measure the height of a building? (A) millimetre (B) centimetre (C) metre (D) kilometre ____	C

	Instrument	Correct Response
QLS 0104 VM	Which one of the following measurements could be the length of a boy's belt? (A) 55 mm (B) 55 cm (C) 55 m (D) 55 km _____	B
QLS 0105 VM	Which one of the following measurements could be the width of a room? (A) 4 mm (B) 4 cm (C) 4 m (D) 4 km _____	C
QLS 0106 VM	Which one of the following measurements could be the distance between two cities in different provinces? (A) 150 mm (B) 150 cm (C) 150 m (D) 150 km _____	D
QLS 0107 VR	Name the metric unit that is used to measure the distance to be run in the sprints at a track and field meet. _____	metre
QLS 0108 VR	Name the metric unit that is used to measure the lengths of rivers. _____	kilometre

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Standard Units	Skills

Objective — Given a unit of length (mm, cm, m, km), the student will identify objects or dimensions of objects commonly measured in that unit.

	Instrument	Correct Response
QLS 0201 VR	Name 3 objects which have features commonly measured in metres. 1. _____ 2. _____ 3. _____	
QLS 0202 VR	Name 3 objects which have features commonly measured in centimetres. 1. _____ 2. _____ 3. _____	
QLS 0203 VR	Name 3 objects which have features commonly measured in millimetres. 1. _____ 2. _____ 3. _____	

	Instrument	Correct Response
QLS 0204 VM	Which of the following is commonly measured in millimetres? (A) widths of wallpaper (B) widths of buttons (C) lengths of garden hoses (D) lengths of cables _____	B
QLS 0205 VM	Which of the following is commonly measured in centimetres? (A) distances on golf courses (B) thicknesses of coins (C) lengths of shoe laces (D) widths of highways _____	C
QLS 0206 VM	Which of the following is commonly measured in kilometres? (A) length of a baseball stadium (B) distance between cities (C) distance between stars (D) heights of mountains _____	B
QLS 0207 VM	38 cm is most likely the measurement of the (A) height of the seat of a chair (B) height of a doorway (C) depth of a swimming pool (D) width of a ribbon _____	A
QLS 0208 VM	38 m is most likely the measurement of the (A) distance between two towns (B) height of a refrigerator (C) length of a railway car (D) width of a truck _____	C

	Instrument	Correct Response
QLS 0209 VM	38 km is most likely the measurement of the (A) height of a skyscraper (B) width of a subway platform (C) depth of a canyon (D) width of a lake _____	D
QLS 0210 VR	Name an object whose length is commonly measured in millimetres. _____	
QLS 0211 VR	Name an object whose width is commonly measured in centimetres. _____	
QLS 0212 VR	Name an object whose height is commonly measured in metres. _____	

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Notation	Skills

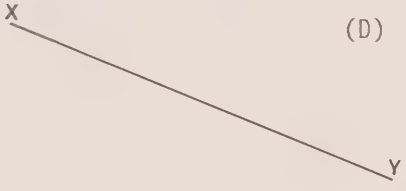
Objective — Given a measurement of a length in one unit (mm, cm, m, km), the student will convert the measurement to another metric unit.

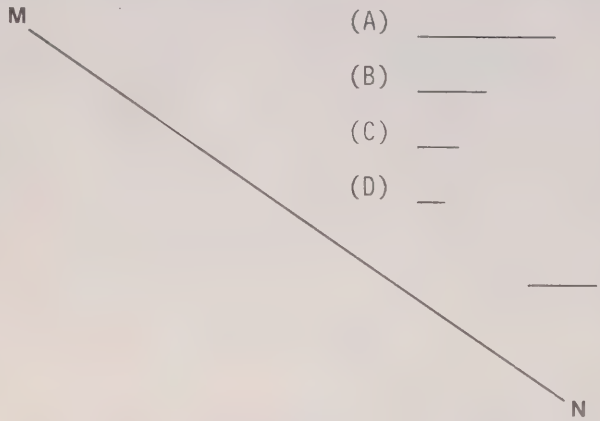
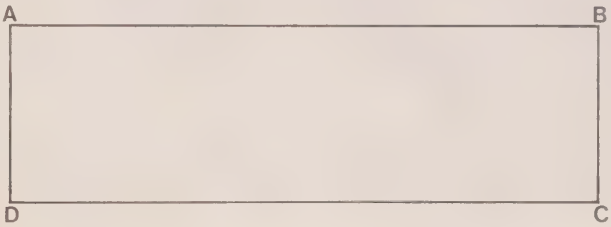
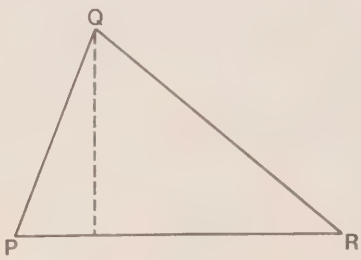
	Instrument	Correct Response
QLN 0101 VM	32 cm = (A) 3200 mm (B) 320 mm (C) 3.2 mm (D) 0.32 mm _____	B
QLN 0102 VM	1.67 km = (A) 16.7 m (B) 167.0 m (C) 1670.0 m (D) 16 700.0 m _____	C
QLN 0103 VM	45 mm = (A) 4.5 cm (B) 0.45 cm (C) 0.045 cm (D) 0.0045 cm _____	A
QLN 0104 VR	Express 5.6 m in centimetres. _____	560 cm

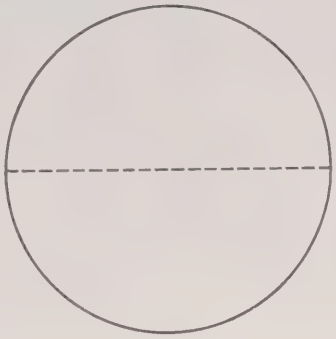
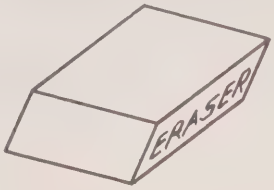
	Instrument	Correct Response
QLN 0105 VR	Express 75.8 m in kilometres.	
	_____	0.0758 km
QLN 0106 VR	Express 6.7 cm in millimetres.	
	_____	67 mm

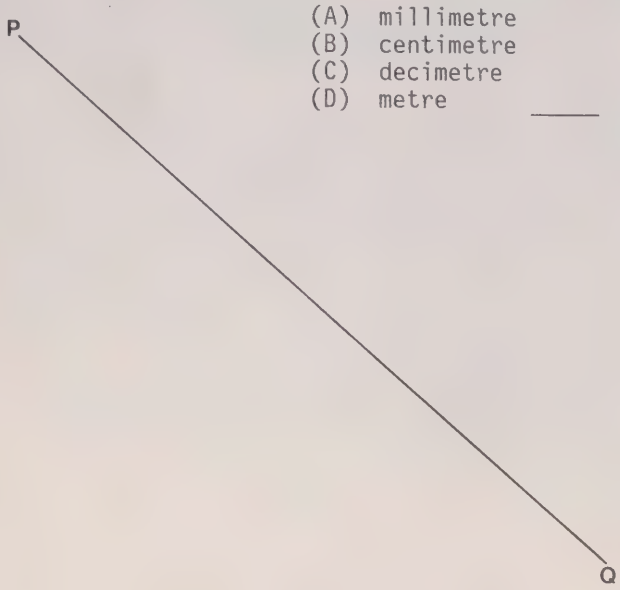
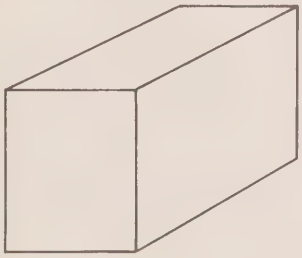
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Estimation	Understanding

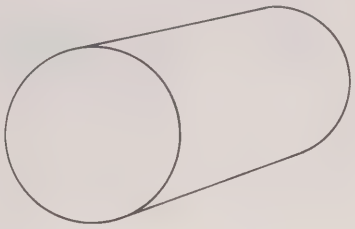
Objective Given a dimension of an object, the student will identify the unit used.

	Instrument	Correct Response
QLE 0101 DM	The length of line PQ is 3 units. Which one of these units was used to make the measurement? P Q (A) _____ (B) _____ (C) ___ __ (D) __	C
QLE 0102 DM	The length of line XY is 16 'units'. Which one of these 'units' was used to make the measurement? (A) __ (B) ____ (C) _____ (D) _____ 	A

	Instrument	Correct Response
QLE 0103 DM	The length of line MN is 9 'units'. Which one of these 'units' was used to make the measurement? 	B
QLE 0104 DS	The length of rectangle ABCD is 3 units. Draw a picture of the units used to make make the measurement. 	Line segment 2.5-3.5 cm
QLE 0105 DS	The height of triangle PQR is 4 units. Draw a picture of the unit used to make the measurement. 	Line segment 6-10 mm

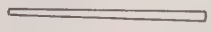
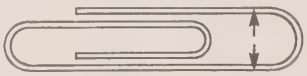
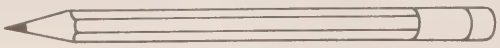
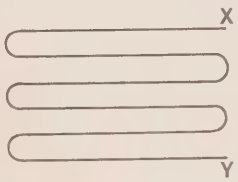
	Instrument	Correct Response
QLE 0106 DS	The diameter of this circle is $2\frac{1}{2}$ units. Draw a picture of the unit used to make the measurement. 	Line segment 16-24 mm
QLE 0107 DM	The width of this eraser is 2 units. Which one of the following units was used to make the measurement?  (A) millimetre (B) centimetre (C) decimetre (D) metre _____	B
QLE 0108 DM	The stack of coins is 10 units high. Which one of the following units was used to make the measurement? (A) millimetre (B) centimetre (C) decimetre (D) metre _____	A

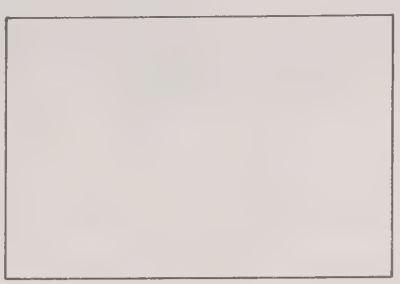
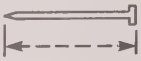
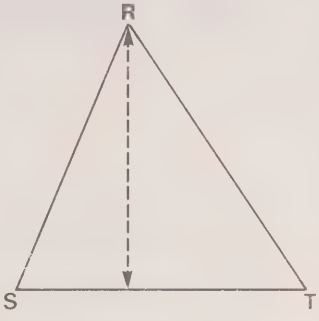
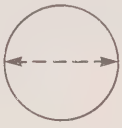
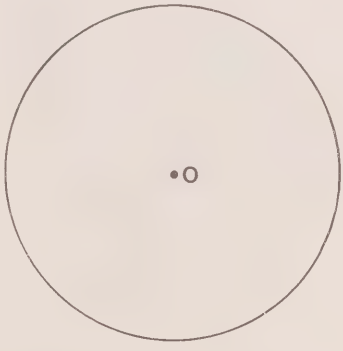
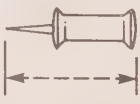
	Instrument	Correct Response
QLE 0109 DM	The distance from P to Q is 1.2 units. Which one of the following units was used to make the measurement? (A) millimetre (B) centimetre (C) decimetre (D) metre _____  	C
QLE 0110 DR	The height of this cuboid is 25 units. Name the metric unit that was used to make the measurement.  _____	millimetre

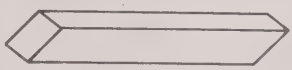
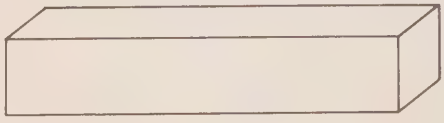
	Instrument	Correct Response
QLE 0111 DR	The diameter of this cylinder is 2.7 units. Name the metric unit that was used to make the measurement.  _____	centimetre
QLE 0112 VR	The width of an audio cassette is 63 units. Name the metric unit that was used to make the measurement. _____	millimetre
QLE 0113 VR	The deepest part of a swimming pool is 4.2 units. Name the metric unit that was used to make the measurement. _____	metre
QLE 0114 VR	A house is built on a lot that is 16.6 units wide. Name the metric unit that was used to make the measurement. _____	metre

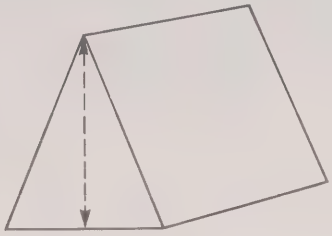
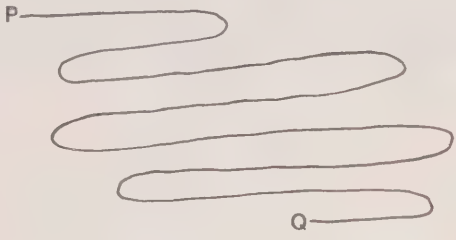
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Estimation	Skills

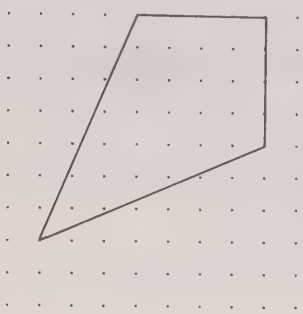
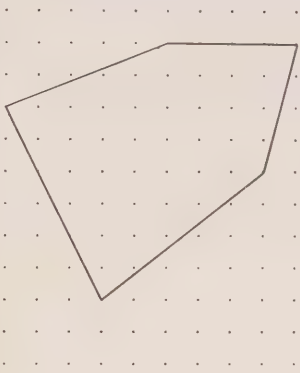
Objective — Given a unit of length and a feature of an object to be measured, the student will estimate the measurement.

	Instrument	Correct Response
QLE 0201 DM	Using the toothpick shown here, the best estimate of the length of line PQ is  (A) 1 'toothpick' (B) 2 'toothpicks' (C) 3 'toothpicks' (D) 4 'toothpicks' ____	B
QLE 0202 DM	Using the width of the paper clip shown here, the best estimate of the length of XY is  (A) 3 'paper clips' (B) 5 'paper clips' (C) 7 'paper clips' (D) 9 'paper clips' ____	C
QLE 0203 DM	Using the length of the pencil shown here, the best estimate of the length of XY is   (A) 3 'pencils' (B) 4 'pencils' (C) 5 'pencils' (D) 6 'pencils' ____	A

	Instrument	Correct Response
QLE 0204 DR	Using the nail shown below, make an estimate of the perimeter of rectangle PQRS.   _____	10-12 nails
QLE 0205 DR	Using the dime shown below, make an estimate of the height of triangle RST.   _____	2-3 dimes
QLE 0206 DR	Using the pin shown below, make an estimate of the diameter of the circle.   _____	2-3 pins

	Instrument	Correct Response
QLE 0207 DR	The best estimate for the length of the eraser is  (A) 2 cm (B) 3 cm (C) 4 cm (D) 5 cm ____	C
QLE 0208 DM	The best estimate for the height of the stack of coins is (A) 4 mm (B) 6 mm (C) 8 mm (D) 10 mm ____	D
QLE 0209 DM	The best estimate for the distance from P to Q is P (A) 0.5 dm (B) 1.0 dm (C) 1.5 dm (D) 2.0 dm ____ Q	B
QLE 0210 DR	Using the unit shown below, make an estimate of the length of the cuboid.  ____	5-7

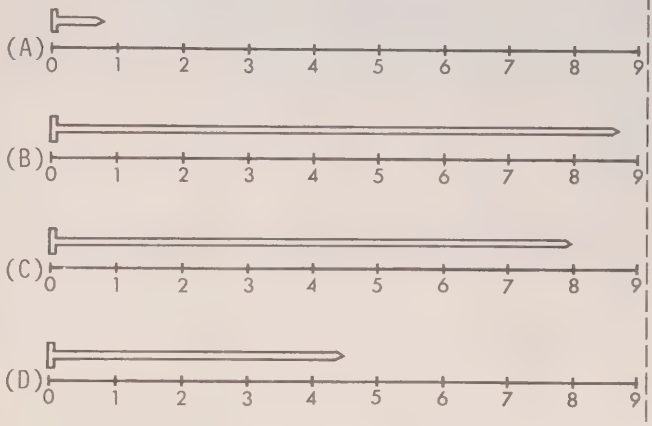
	Instrument	Correct Response
QLE 0211 DR	Using the unit shown below, make an estimate of the height of the prism.  _____	2-3
QLE 0212 DR	Using the unit shown below, make an estimate of the length of the given string PQ.  _____	2-4
QLE 0213 VM	The best estimate of the width of a $1 bill is (A) 45 mm (B) 60 mm (C) 75 mm (D) 100 mm _____	C
QLE 0214 VM	The best estimate of the height of an average door is (A) 100 cm (B) 125 cm (C) 150 cm (D) 200 cm _____	D

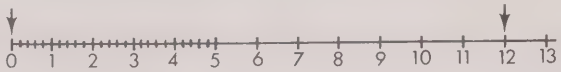
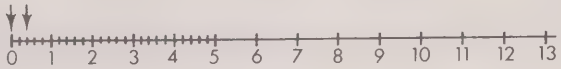
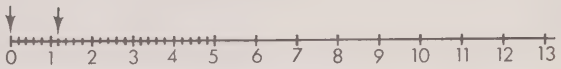
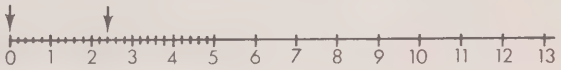
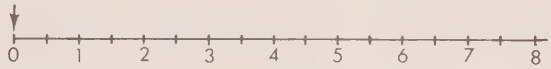
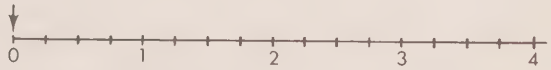
	Instrument	Correct Response
QLE 0215 DR	Estimate the perimeter of this figure in centimetres.  _____	10-12 cm
QLE 0216 DR	Estimate the perimeter of this figure in centimetres.  _____	12-14 cm
QLE 0217 VR	Make an estimate in millimetres of the width of a popsicle stick. _____	8-12 mm

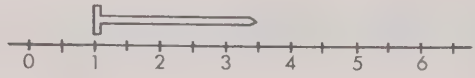
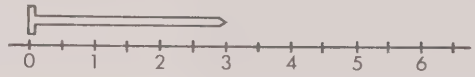
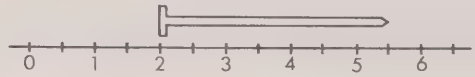
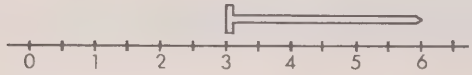
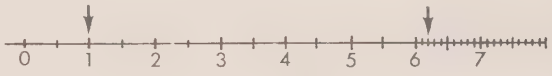
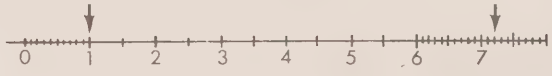
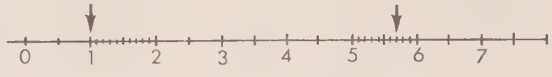
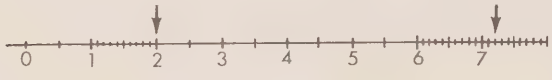
	Instrument	Correct Response
QLE 0218 VR	Make an estimate in centimetres of the height of your teacher's desk. _____	65-85 cm
QLE 0219 VR	Make an estimate in metres of the width of your school gym. _____	Allow error of ±20%

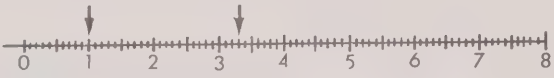
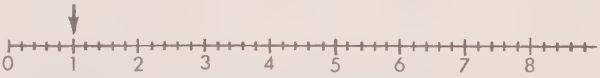
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Measuring	Understanding

Objective Given a measurement of length, the student will identify the reading on a scale.

	Instrument	Correct Response
QLM 0101 DM	Which one of the following scales shows that a nail has a length of 8 units?  	C

	Instrument	Correct Response
QLM 0102 DM	Which one of the following scales shows a distance between the arrows of 1.2 units? (A)  (B)  (C)  (D) 	C
QLM 0103 VS	Mark the given scale with ↓ to show that the height of a glass is 13 units. 	
QLM 0104 VS	Mark the given scale with ↓ to show that the length of a stamp is 3.5 units. 	
QLM 0105 VS	Mark the given scale with ↓ to show that the diameter of a coin is 1.25 units. 	

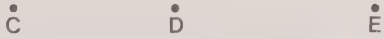
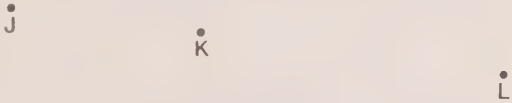
	Instrument	Correct Response
QLM 0106 DM	Which one of the following scales shows that a nail has a length of 3.5 units? (A)  (B)  (C)  (D)  ____	C
QLM 0107 DM	Which one of the following scales shows a distance betweem the arrows of 6.2 units? (A)  (B)  (C)  (D)  ____	B

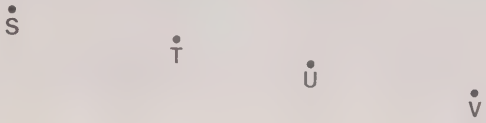
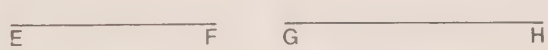
	Instrument	Correct Response
QLM 0108 DM	Which one of the following scales shows a distance betweem the arrows of 1.3 units? (A) (B)  (C) (D)	A
QLM 0109 VS	Draw another arrow on the scale below to show that the length of a rod is 2.3 units. 	3.3 mark
QLM 0110 VS	Draw another arrow on the scale below to show that the width of a tray is 6.8 units. 	7.8 mark
QLM 0111 VS	Draw another arrow on the scale below to show that the diameter of a jug is 1.2 units. 	3.2 mark

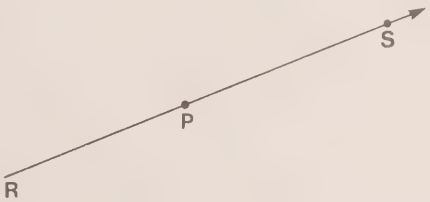
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Measuring	Skills

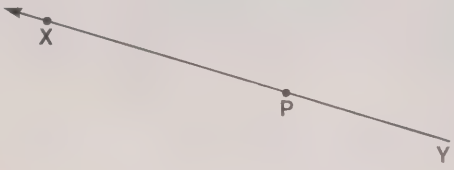
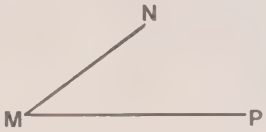
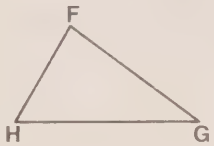
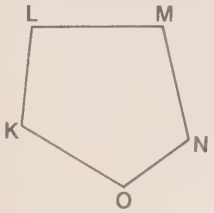
Objective — Given a distance to be measured, the student will use a ruler to make the measurement.

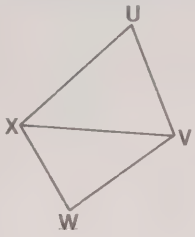
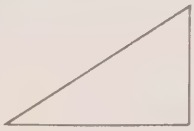
	Instrument	Correct Response
QLM 0201 DM	The length of line segment EF is (A) 61 mm (B) 63 mm (C) 66 mm (D) 69 mm ____	C
QLM 0202 DM	The length of line segment LJ is (A) 3.4 cm (B) 3.6 cm (C) 3.8 cm (D) 4.0 cm ____	B
QLM 0203 DR	Measure the distance from K to L. _____	50 mm or 5.0 cm (±1 mm)

	Instrument	Correct Response
QLM 0204 DR	Measure the distance from Q to R. _____	36 mm or 3.6 cm (±1 mm)
QLM 0205 DM	The distance between the two points that are closest together is  (A) 25 mm (B) 27 mm (C) 29 mm (D) 31 mm _____	A
QLM 0206 DM	The distance between the two points that are farthest apart is  (A) 7.3 cm (B) 7.5 cm (C) 7.7 cm (D) 7.9 cm _____	C

	Instrument	Correct Response
QLM 0207 DM	The distance between the two points that are closest together is  (A) 19 mm (B) 21 mm (C) 23 mm (D) 25 mm	B
QLM 0208 DM	The distance between the two points that are farthest apart is (A) 6.2 cm (B) 6.4 cm (C) 6.6 cm (D) 6.8 cm	C
QLM 0209 DR	Measure the length of the shorter line segment.  	32 mm ± 1 mm

	Instrument	Correct Response
QLM 0210 DR	Measure the length of the longer line segment. A B C D _____	32 mm ± 1 mm
QLM 0211 DR	Measure the length of the shortest line segment. P Q R S T U _____	20 mm ± 1 mm
QLM 0212 DR	Measure the length of the longest line segment. J K L M N O _____	25 mm ± 1 mm
QLM 0213 DM	This diagram shows a ray RS with point P in it. How many points can be located on this ray that are 2.5 cm from P?  (A) 0 (B) 1 (C) 2 (D) 3 ____	C

	Instrument	Correct Response
QLM 0214 DM	This diagram shows a ray YX with point P in it. How many points can be located on this ray that are 3 cm from P?  (A) 0 (B) 1 (C) 2 (D) 3 ____	B
QLM 0215 DM	The length of the line segment MN is  (A) 17 mm (B) 19 mm (C) 21 mm (D) 23 mm ____	D
QLM 0216 DM	The length of the line segment HG is  (A) 2.2 cm (B) 2.4 cm (C) 2.6 cm (D) 2.8 cm ____	D
QLM 0217 DM	The length of the line segment KO is  (A) 14 mm (B) 16 mm (C) 18 mm (D) 20 mm ____	C

	Instrument	Correct Response
QLM 0218 DM	The length of the line segment XV is  (A) 2.2 cm (B) 2.4 cm (C) 2.6 cm (D) 2.8 cm ____	B
QLM 0219 DR	Measure and record the length of the shorter of the two parallel sides in this figure. _____	35 ± 1 mm or equivalent
QLM 0220 DR	Measure and record the length of the longest side of this triangle.  _____	34 ± 1 mm or equivalent

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Length	Measuring	Skills

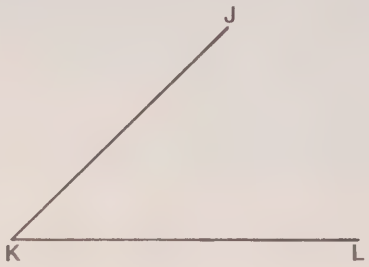
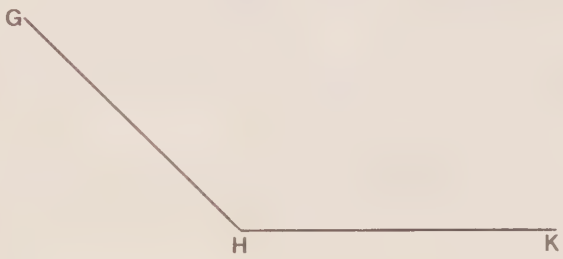
Objective Given specific measurements of a geometric figure and appropriate instruments, the student will draw the figure.

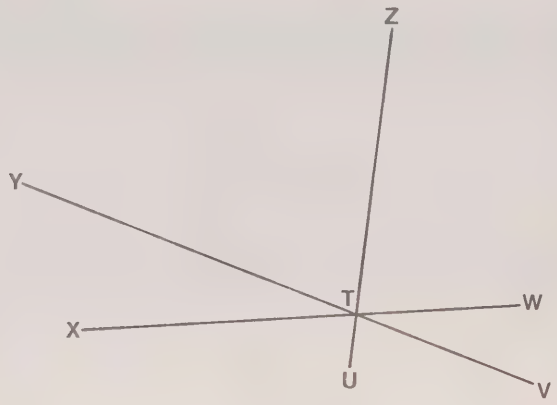
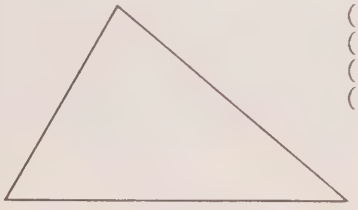
	Instrument	Correct Response
QLM 0301 VS	Draw a line segment QR that has a length of 6 cm.	±2 mm
QLM 0302 VS	Draw a line segment XY that has a length of 57 mm.	±2 mm
QLM 0303 VS	Draw points E and F 4 cm apart.	±2 mm

	Instrument	Correct Response
QLM 0304 VS	Use a ruler to draw a line segment 6 cm long. Label it XZ. Find the mid point of XZ. Label it Y.	±2 mm
QLM 0305 VS	Use ruler and compasses to construct an equilateral triangle, given that the length of one side is 4 cm.	±2 mm
QLM 0306 VS	Use a ruler and protractor to construct a square, given that the length of one side is 3.7 cm.	±2 mm ±3°

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Angles	Measuring	Skills

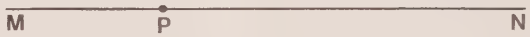
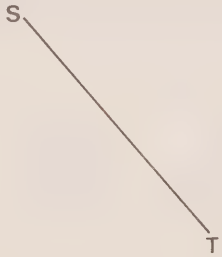
Objective Given an angle, the student will use a protractor to measure the angle.

	Instrument	Correct Response
QNM 0101 DR	Measure the size of angle JKL in this diagram.  Angle JKL is _____	Any measure from 42° to 48°
QNM 0102 DR	Measure the size of angle GHK in this diagram.  Angle GHK is _____	Any measure from 132° to 138°

	Instrument	Correct Response
QNM 0103 DR	Measure the size of angle YTZ in this diagram.  Angle YTZ is _____	Any measure from 72° to 78°
QNM 0104 DR	The measure of the smallest angle in this triangle is  (A) 40° (B) 50° (C) 55° (D) 60° ____	A

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Angles	Measuring	Skills

Objective — Given the size of an angle and a ruler and protractor, the student will construct the angle.

	Instrument	Correct Response
QNM 0201 DS	Use a ruler and protractor to construct an angle of 53° at point P.  	Allow error of ±3°
QNM 0202 DS	Use a ruler and protractor to construct an angle of 36° at point S.  	Allow error of ±3°
QNM 0203 DS	Use a ruler and protractor to construct an angle of 110° at point U. 	Allow error of ±3°

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Area	Arbitrary Units	Understanding

Objective — Given an area to be measured, the student will choose an appropriate arbitrary unit.

	Instrument	Correct Response
QAA 0101 DM	Which one of the following is best suited for measuring the surface of a table top? (A) (B) (C) (D) ____	B
QAA 0102 DM	Which one of the following is best suited for measuring the area of a window? (A) (B) (C) (D) ____	D

	Instrument	Correct Response
QAA 0103 VM	Which one of the following is best suited for measuring the area of a patio? (A) a frisbee (B) a bicycle (C) a piece of rope (D) a floor tile _____	D
QAA 0104 VM	Which one of the following is best suited for measuring the surface area of a door? (A) a pencil (B) an envelope (C) a toy truck (D) a tree branch _____	B

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Area	Standard Units	Understanding

Objective Given a surface to be measured, the student will identify the most appropriate unit (mm^2, cm^2, m^2, ha).

	Instrument	Correct Response
QAS 0101 CR	Provide the student with cardboard models of a square centimetre, square decimetre, and square metre. Say, "Choose the best unit for measuring each of these surfaces: (1) a wall in the classroom; (2) the top of your desk; (3) a snapshot; (4) the sole of your foot. Explain why each unit you chose was the best."	Reason should refer to efficiency, accuracy, ...
QAS 0102 DM	Which one of the following units is the best unit for measuring the face of a postcard? (A) square millimetre (B) square centimetre (C) square metre (D) hectare _____	B
QAS 0103 DM	Which one of the following units is the best unit for measuring the surface of a rink? (A) square millimetre (B) square centimetre (C) square metre (D) hectare _____	C

	Instrument	Correct Response
QAS 0104 DM	Which one of the following units is the best unit for measuring the area of a farm? (A) square millimetre (B) square centimetre (C) square metre (D) hectare _____	D
QAS 0105 VM	Which one of the following measurements is most likely to be the area of a bed sheet? (A) 4 mm^2 (B) 4 cm^2 (C) 4 m^2 (D) 4 km^2 _____	C
QAS 0106 VM	Which one of the following measurements is most likely to be the area of a postage stamp? (A) 450 mm^2 (B) 450 cm^2 (C) 450 m^2 (D) 450 km^2 _____	A
QAS 0107 VM	Which one of the following measurements is most likely to be the area of Algonquin Provincial Park? (A) 4320 mm^2 (B) 4320 cm^2 (C) 4320 m^2 (D) 4320 km^2 _____	D

	Instrument	Correct Response
QAS 0108 VR	Name the metric unit best suited to measure the area of carpet. _____	square metre (m^2)
QAS 0109 VR	Name the metric unit best suited to measure the area of a dollar bill. _____	square centimetre (cm^2)
QAS 0110 VR	Name the metric unit commonly used to measure the area of Lake Superior. _____	square kilometre (km^2)

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Area	Standard Units	Skills

Objective — Given a unit of area (mm^2, cm^2, dm^2, km^2), the student will identify objects whose areas are commonly measured in that unit.

	Instrument	Correct Response
QAS 0201 CR	Name a surface that could best be measured using: (i) square centimetres (ii) square decimetres (iii) square metres (i) _____ (ii) _____ (iii) _____	
QAS 0202 VM	Which one of the following areas is best measured in square millimetres? (A) door on a refrigerator (B) wing of a honey bee (C) a window pane (D) roof of a house _____	B
QAS 0203 VM	Which one of the following areas is best measured in square centimetres? (A) carpet in a bedroom (B) wallpaper (C) photograph (D) footprint of a spider _____	C

	Instrument	Correct Response
QAS 0204 VM	Which one of the following areas is best measured in square metres? (A) a mirror (B) a parking lot (C) the face of a clock (D) a page of a notebook _____	B
QAS 0205 VM	160 cm^2 could be the area of a (A) dial on a wrist watch (B) floor mat in a car (C) patio (D) postcard _____	D
QAS 0206 VM	160 m^2 could be the area of (A) a hockey rink (B) Lake Nipissing (C) a pizza (D) a sailboard _____	A
QAS 0207 VM	12 km^2 could be the area of (A) a desk top (B) a finger print (C) a town (D) a baseball diamond _____	C
QAS 0208 VR	Name a surface commonly measured in square centimetres. _____	

	Instrument	Correct Response
QAS 0209 VR	Name a surface commonly measured in square metres. _____	
QAS 0210 VR	Name a surface commonly measured in square kilometres. _____	

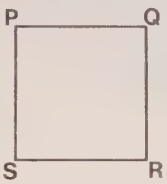
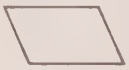
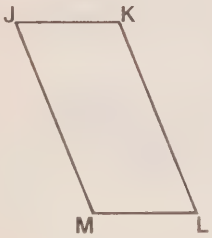
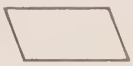
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Area	Notation	Skills

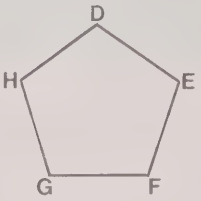
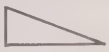
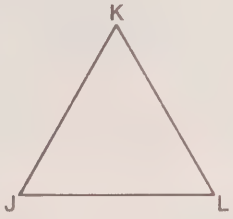
Objective Given a measurement of area in one unit (mm^2, cm^2, m^2, km^2), the student will convert the measurement to another metric unit.

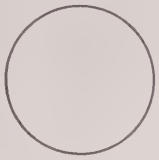
	Instrument	Correct Response
QAN 0101 VR	How many square centimetres are there in $1m^2$? _____	10 000 cm^2
QAN 0102 VR	How many square metres are there in 1 km^2? _____	1 000 000 m^2
QAN 0103 VR	How many square millimetres are there in 1 cm^2? _____	100 mm^2

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Area	Estimation	Understanding

Objective — Given a surface and its area in arbitrary or metric units (mm^2, cm^2, dm^2, m^2, ha), the student will identify the unit used.

	Instrument	Correct Response
QAE 0101 DM	The area of PQRS is 4 units. Which one of these units was used to make the measurement?  (A) (B) (C) (D)  ____	B
QAE 0102 DM	The area of JKLM is 6 units. Which one of these units was used to make the measurement?  (A) (B) (C)  (D) ____	D

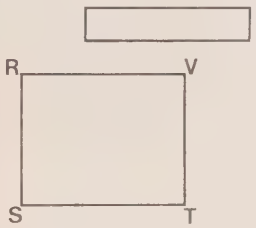
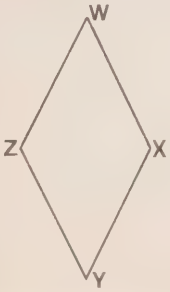
	Instrument	Correct Response
QAE 0103 DM	The area of DEFGH is 5 units. Which one of these units was used to make the measurement?  (A) (B) (C)  (D) ____	D
QAE 0104 DS	The area of triangle JKL is 4 units. Draw a picture of the unit used to make the measurement. 	Joining midpoints of sides or equivalent
QAE 0105 DM	The area of the stamp shown below is about 400 units. Which one of the following units was used to make the measurement? (A) square millimetre (B) square centimetre (C) square decimetre (D) square metre ____	A

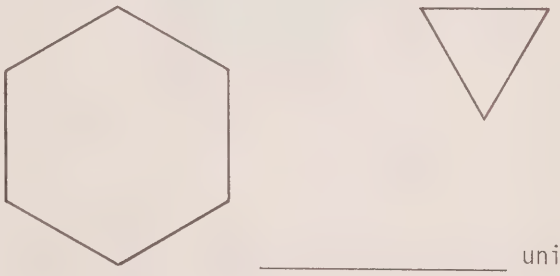
	Instrument	Correct Response
QAE 0106 VR	The area of the disc shown below is about 3 units. Which one of the following units was used to make the measurement?  (A) square millimetre (B) square centimetre (C) square decimetre (D) square metre ____	B
QAE 0107 CM	The area of this page is about 6 units. Which one of the following units was used to make the measurement? (A) square millimetre (B) square centimetre (C) square decimetre (D) square metre ____	C
QAE 0108 VR	A record album has a surface that measures 930 square units. Name the standard metric unit used to make the measurement. _____	square centimetre (cm^2)
QAE 0109 VR	The carpet in a living room measures 12 square units. Name the standard metric unit used to make the measurement. ____ _____	square metre (m^2)

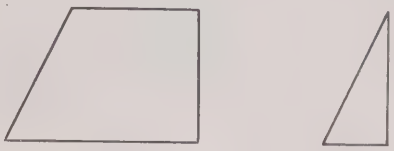
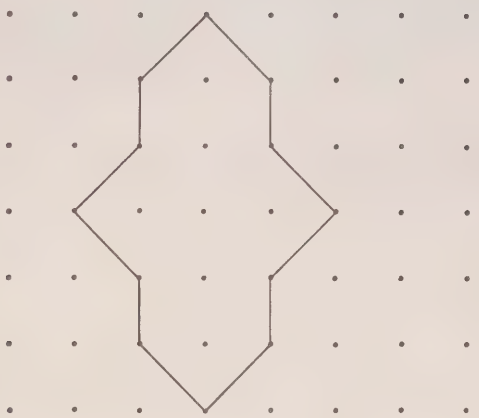
	Instrument	Correct Response
QAE 0110 VR	A field of corn measures 35 units. Name the standard metric unit used to make the measurement. _____	hectare (ha)

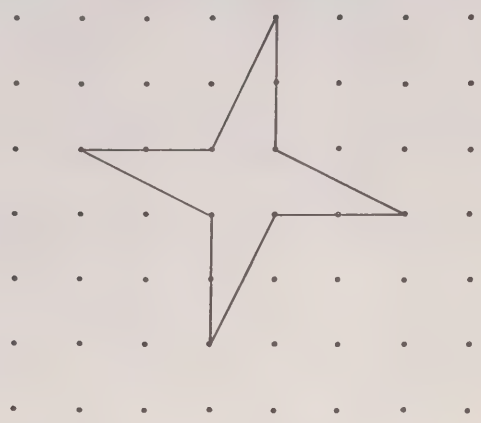
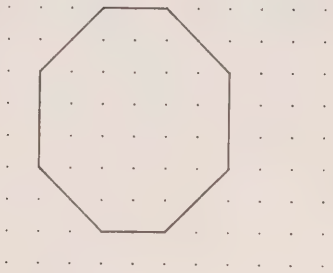
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Area	Measuring	Skills

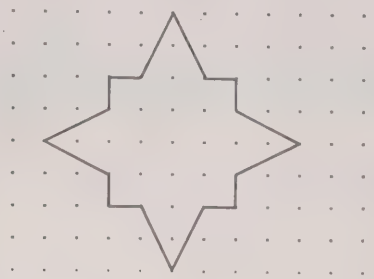
Objective Given a surface and a unit of area, the student will measure the area.

	Instrument	Correct Response
QAM 0101 CR	Provide the student with a double page from a newspaper, centicubes, sheets of note paper, popsicle sticks, bottle caps. Ask, "What would you choose to measure the surface of this newspaper? How many do you think you will need to cover the surface? Do it." "How could you find out what fraction of the page is used for advertising? Estimate first, then measure the surface used for ads."	
QAM 0102 DM	Using the unit shown, the best estimate of the area of RSTV is  (A) 2 units (B) 4 units (C) 6 units (D) 8 units ____	B
QAM 0103 DM	Using the unit shown, the best estimate of the area of WXYZ is  (A) 1 units (B) 2 units (C) 3 units (D) 4 units ____	D

	Instrument	Correct Response
QAM 0104 CR	Provide the student with a postcard and a stamp. Say, "Using the stamp as a unit, estimate the area of the postcard." _____	Likely about 30 but could vary
QAM 0105 DR	Using the unit shown below, measure the area of figure 1. Figure 1 _____ units	11
QAM 0106 DR	Using the unit shown below, measure the area of figure 1.  Figure 1 _____ units	6

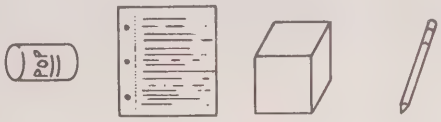
	Instrument	Correct Response
QAM 0107 DR	Using the unit shown below, measure the area of figure 1.  Figure 1 _____ units	5 units
QAM 0108 DR	Estimate the area of this figure in square centimetres.  _____	12 cm^2

	Instrument	Correct Response
QAM 0109 DR	Estimate the area of this figure in square centimetres.  _____	5 cm^2
QAM 0110 DR	Estimate the area of this figure in square centimetres.  _____	8.5 ± 0.5 cm^2

	Instrument	Correct Response
QAM 0111 DR	Estimate the area of this figure in square centimetres.  _____	6 ± 0.5 cm^2
QAM 0112 VM	The best estimate for the area of a $1 bill is (A) 50 cm^2 (B) 75 cm^2 (C) 100 cm^2 (D) 125 cm^2 _____	C
QAM 0113 VR	Estimate the area of the surface of your desk. _____ dm^2	Allow error of ±20%
QAM 0114 VR	Estimate the area of the floor of your classroom. _____ m^2	Allow error of ±20%
QAM 0115 VR	Estimate the area of one side of your classroom door. _____ dm^2	Allow error of ±20%
QAM 0116 VR	Estimate the area of a floor tile. _____ cm^2	Allow error of ±20%

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Volume	Arbitrary Units	Understanding

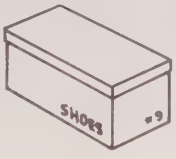
Objective — Given a volume or capacity to be measured, the student will choose an appropriate object as an arbitrary unit.

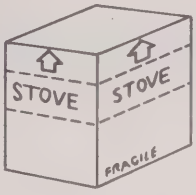
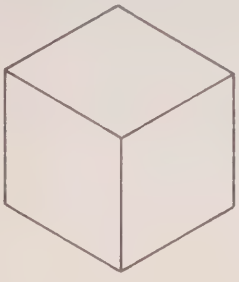
	Instrument	Correct Response
QVA 0101 DR	Which of the following is best suited as a unit for measuring the volume of a cereal box?  (A) (B) (C) (D) _____ Explain why the unit you chose is the best. _____ _____	C Best fit, fills space, or other justification
QVA 0102 DR	Which one of the following is best suited as a unit for measuring the volume of a truck load of sand? (A) (B) (C) (D) _____ Explain why the unit you chose is the best. _____ _____	B Largest measure, most efficient, or other justification

	Instrument	Correct Response
QVA 0103 VR	Which one of the following is best suited for measuring the volume of a picnic cooler? (A) a flashlight (B) a brick (C) a record album (D) a length of rope _____ Explain why the unit you chose is the best. _____ _____	B Best fit, similar shape, or other justification
QVA 0104 VR	Which one of the following is best suited for measuring the volume of a box car? (A) a newspaper (B) a length of pipe (C) a dish pan (D) a packing case _____ Explain why the unit you chose is the best. _____ _____	D Best fit, similar shape, or other justification

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Volume	Arbitrary Units	Understanding

Objective Given an object as an arbitrary unit, the student will choose a volume or capacity that can be measured using that unit.

	Instrument	Correct Response
QVA 0201 DM	The shoe box can best be used to measure the volume of a  (A) telephone pole (B) battleship (C) smoke stack (D) freezer _____	D
QVA 0202 DR	Name an object whose volume can be measured by using the paper clip box as an arbitrary unit. _____ Give a reason for your choice. _____ _____	Similar shape, appropriate size, or other justification

	Instrument	Correct Response
QVA 0203 DM	The packing case can best be used to measure the volume of a  (A) medicine cabinet (B) garage (C) bookcase (D) balloon _____	B
QVA 0204 DM	The 2-cm cube can best be used to measure the volume of a  (A) piano (B) desk drawer (C) warehouse (D) stereo _____	B
QVA 0205 VM	A sugar cube can best be used to measure the volume of a (A) ballpoint pen (B) moving van (C) stack of lumber (D) jewel box _____	D
QVA 0206 VM	A telephone book can best be used to measure the volume of (A) an oil drum (B) a cupboard (C) a pop case (D) a bulletin board _____	B

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Volume	Standard Units	Understanding

Objective Given a volume or capacity to be measured, the student will identify the most appropriate unit (mm^3, cm^3, dm^3, mL, L).

	Instrument	Correct Response
QVS 0101 DM	Which one of the following units is best suited to measure the volume of a die? (A) cubic centimetre (B) cubic decimetre (C) cubic metre _____ Explain why the unit you chose is best. _____ _____ _____	A Appropriate reason (other answers acceptable if suitably justified)
QVS 0102 DM	Which one of the following units is best suited to measure the volume of a filing cabinet? (A) cubic centimetre (B) cubic decimetre (C) cubic metre _____ Explain why the unit you chose is best. _____ _____ _____	B Appropriate reason (other answers acceptable if suitably justified)

	Instrument	Correct Response
QVS 0103 DM	Which one of the following units is best suited to measure the volume of a silo? (A) cubic centimetre (B) cubic decimetre (C) cubic metre _____	C
QVS 0104 VM	Which one of the following measurements is the volume of a litre of milk? (A) 1000 mm^3 (B) 1000 cm^3 (C) 1000 dm^3 (D) 1000 m^3 _____	B
QVS 0105 VM	Which one of the following measurements could be the volume of air in a classroom? (A) 210 mm^3 (B) 210 cm^3 (C) 210 dm^3 (D) 210 m^3 _____	D
QVS 0106 VM	Which one of the following measurements could be the volume of a box of thumb tacks? (A) 60 mm^3 (B) 60 cm^3 (C) 60 dm^3 (D) 60 m^3 _____	B
QVS 0107 VM	Which one of the following measurements could be the capacity of a large bottle of pop? (A) 750 mm^3 (B) 750 L (C) 750 mL (D) 750 m^3 _____	C

	Instrument	Correct Response
QVS 0108 VR	(i) Name a metric unit that could be used to measure the volume of a railway box car. _____	cubic metre (m^3)
	(ii) Why would you use this unit? _____ _____	Appropriate reason
QVS 0109 VR	(i) Name a metric unit that could be used to measure the volume of a microwave oven. _____	cubic decimetre (dm^3), cubic centimetre (cm^3), litre (L)
	(ii) Why would you use this unit? _____ _____	Appropriate reason
QVS 0110 VR	(i) Name a metric unit that could be used to measure the capacity of an aquarium. _____	litre (L)
	(ii) Why would you use this unit? _____ _____	Appropriate reason

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Volume	Standard Units	Understanding

Objective — Given a unit of volume or capacity (mm^3, cm^3, dm^3, m^3, mL, L), the student will identify objects whose volumes or capacities are commonly measured in that unit.

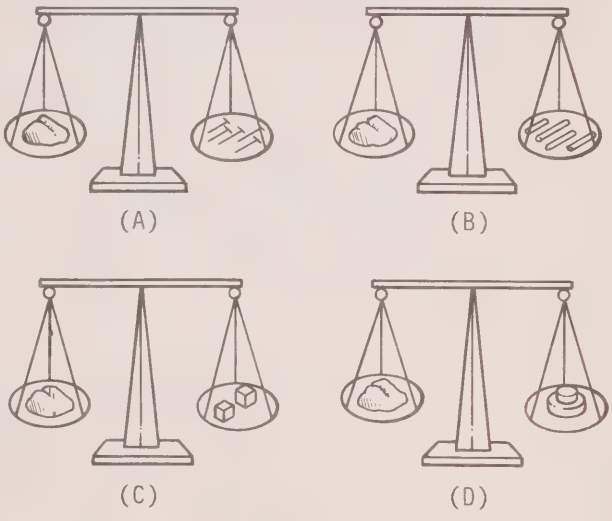
	Instrument	Correct Response
QVS 0201 CR	Name an object whose volume could best be measured using a (i) cubic centimetre (ii) cubic decimetre (iii) cubic metre (i) _____ (ii) _____ (iii) _____	
QVS 0202 VM	Which one of the following capacities is best measured in millilitres? (A) a pail of water (B) a tank of gasoline (C) a bottle of cough syrup (D) a truck load of sand ____	C
QVS 0203 VM	Which one of the following volumes is best measured in cubic centimetres? (A) a stick of gum (B) a brick (C) water in a swimming pool (D) air in a classroom ____	B

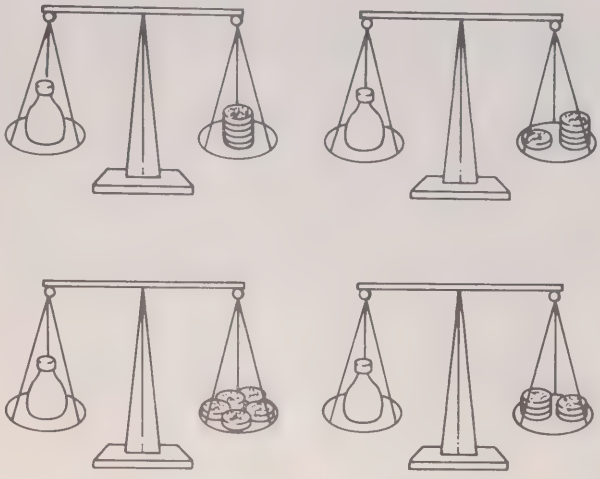
	Instrument	Correct Response
QVS 0204 VM	Which one of the following volumes is best measured in cubic metres? (A) a box car (B) a box of cereal (C) a micro wave oven (D) a jar of honey _____	A
QVS 0205 VM	1700 cm^3 could be the volume of (A) a suitcase (B) an elevator (C) a box of chalk (D) a truck load of wood _____	C
QVS 0206 VM	400 dm^3 could be the capacity of (A) a dictionary (B) a dump truck (C) a theatre (D) a refrigerator _____	D
QVS 0207 VM	70 m^3 could be the volume of (A) a carton of oranges (B) a living room (C) a loaf of bread (D) a washing machine _____	B
QVS 0208 VM	200 L could be the capacity of (A) an oil drum (B) a swimming pool (C) a tank truck (D) a bottle of salad oil _____	A

	Instrument	Correct Response
QVS 0209 VR	Name an object whose volume is commonly measured in cubic centimetres. _____	Kleenex box or ...
QVS 0210 VR	Name an object whose volume is commonly measured in cubic metres. _____	Room or ...
QVS 0211 VR	Name an object whose capacity is commonly measured in millilitres. _____	Pop bottle or ...

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Measuring	Understanding

Objective — Given a balance, an arbitrary unit of mass and an object, or their pictures, the student will state the mass of the object.

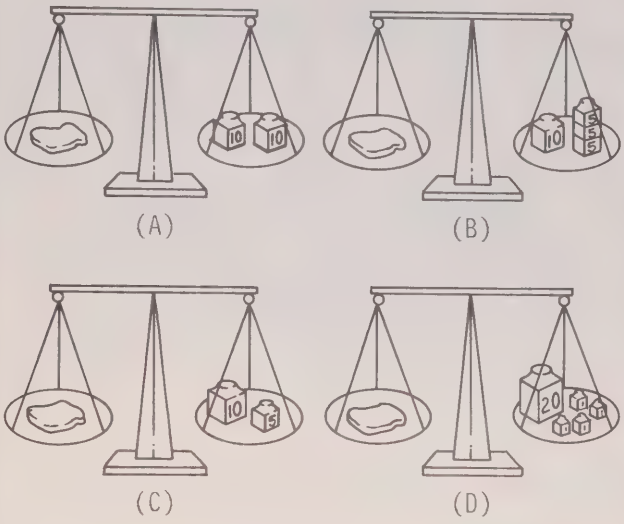
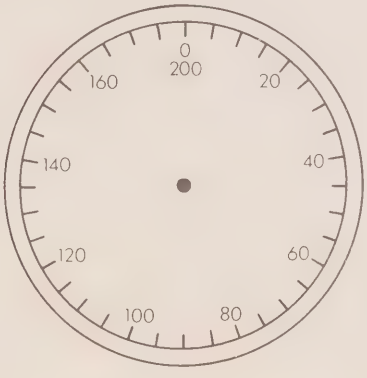
	Instrument	Correct Response
QMM 0101 CR	Provide the student with a balance, an empty tin can, and whole sticks of chalk. Ask "How many sticks of chalk are needed to balance this tin can?"	
QMM 0102 DM	Which one of the following pictures shows that the rock has a mass of 4 pieces of chalk?  ____	B

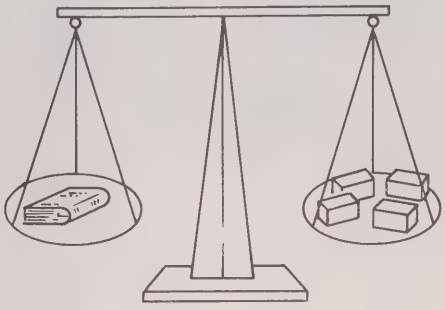
	Instrument	Correct Response
QMM 0103 DM	Which of the following pictures shows that a bottle has a mass of 5 washers?  (A) Figure 1 only (B) Figures 1 and 2 only (C) Figures 1, 2, and 3 only (D) Figures 1, 2, 3 and 4 ____	D
QMM 0104 CR	Provide the student with a balance, two objects with different masses, and a number of washers. Ask, "How many more washers does one weigh than the other?"	
QMM 0105 CR	A pair of scissors balances with five sticks of chalk. How many sticks of chalk are needed to balance three such pairs of scissors? _____	15

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Measuring	Skills

Objective — Given the mass of an object, the student will identify the corresponding reading on a balance or scale.

	Instrument	Correct Response
QMM 0201 DM	Which one of the following scales shows that an object has a mass of 120 kg? (A) (B) (C) (D) ____	C

	Instrument	Correct Response
QMM 0202 DM	Which one of the following balances shows that a slice of bread has a mass of 25 g?  (A) (B) (C) (D) ____	B
QMM 0203 DS	Mark the given scale with an arrow to show that a person has a mass of 65 kg.  	65 ± 2 kg

	Instrument	Correct Response
QMM 0204 DR	Label the standard masses to show that a book has a mass of 350 g. 	3 x 100 g, 1 x 50 g or equivalent

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Estimation	Skills

Objective — Given an everyday object, its picture, or name, the student will estimate its mass.

	Instrument	Correct Response
QME 0101 CR	Provide the student with bathroom scales. Say, "Choose a classmate. Estimate his/her mass and record it. Use the scales to find the actual mass. Compare it with your estimate."	Assess improvement over time
QME 0102 CR	Choose an adult. Estimate his/her mass. Check your estimate.	Assess improvement over time
QME 0103 CR	Provide an object (e.g., 'D' cell battery, orange, box of paper clips). Say, "Estimate, in grams, the mass of this item." _____	Range ± 50%
QME 0104 VR	Estimate, in kilograms, the mass of a 4-L container of milk. _____	2-6 kg
QME 0105 VM	Which one of the following is the best estimate for the mass of a turkey? (A) 2 kg (B) 12 kg (C) 22 kg (D) 32 kg ____	B

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Estimation	Skills

Objective Given a mass, the student will identify an object that has approximately that mass.

	Instrument	Correct Response
QME 0201 CR	Provide the student with a balance and a set of masses. Say, "Choose 3 objects in the classroom that you think have a mass of 500 g. Measure their masses. How close were your estimates?	Assess improvement over time
QME 0202 CR	Provide the student with a scale. Say, "Choose 2 objects or sets of objects in the classroom that you think have a mass of 5 kg. Measure their masses. How close were your estimates?"	Assess improvement over time
QME 0203 VM	10 kg is most likely the mass of (A) a 4-L bag of milk (B) a large jar of coffee (C) a bag of potatoes (D) an empty garbage can _____	C
QME 0204 VM	25 g is most likely the mass of a (A) text book (B) slice of bread (C) 5¢ coin (D) sugar cube _____	B

	Instrument	Correct Response
QME 0205 VM	1 t is most likely the mass of a (A) bag of cement (B) dump truck (C) small car (D) T-V set _____	C
QME 0206 VR	Name an object whose mass is about 500 g. _____	
QME 0207 VR	Name an object whose mass is about 20 kg. _____	
QME 0208 VR	Which one of the following objects has a mass of about 200 g? (A) basketball (B) orange (C) watermelon (D) balloon _____	B
QME 0209 VM	Which one of the following objects has a mass of about 1 kg? (A) TV Guide magazine (B) math text (C) large dictionary (D) comic book _____	C

	Instrument	Correct Response
QME 0210 VM	Which one of the following objects has a mass of about 5 t? (A) small car (B) bicycle (C) big truck (D) large motorcycle _____	C

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Standard Units	Understanding

Objective — Given an object, its picture, or name, whose mass is to be measured, the student will identify the most appropriate unit (mg, g, kg, t).

	Instrument	Correct Response
QMS 0101 CR	Provide the student with a set of objects whose masses range from 5 g to 10 kg (e.g. postage stamps, chalk, paper clips, stack of magazines, bag of sand) and a set of standard masses. Say, "Choose the unit you would use to measure the mass of each of these objects."	Unit chosen should be smaller than mass to be measured
QMS 0102 DM	Which one of the following units is commonly used to measure the mass of a person? (A) milligram (B) gram (C) kilogram (D) tonne _____	C
QMS 0103 DM	Which one of the following units is commonly used to measure the mass of a package of peanuts? (A) milligram (B) gram (C) kilogram (D) tonne _____	B

	Instrument	Correct Response
QMS 0104 DM	Which one of the following units is commonly used to measure the mass of a vitamin-C tablet? (A) milligram (B) gram (C) kilogram (D) tonne _____	A
QMS 0105 DR	Name the metric unit commonly used to measure the mass of the object shown below. _____	gram
QMS 0106 DR	Name the metric unit commonly used to measure the mass of the object shown below. _____	kilogram
QMS 0107 DR	Name the metric unit commonly used to measure the mass of a vitamin capsule. _____	milligram
QMS 0108 VM	Which one of the following units is commonly used to measure the mass of a roast of beef? (A) milligram (B) gram (C) kilogram (D) tonne _____	C

	Instrument	Correct Response
QMS 0109 VM	Which one of the following units would be the best unit to measure the mass of a ball point pen? (A) milligram (B) gram (C) kilogram (D) tonne _____	B
QMS 0110 VM	Which one of the following units would be the best unit to measure the mass of a ship? (A) milligram (B) gram (C) kilogram (D) tonne _____	D
QMS 0111 VR	Name a metric unit that would be the best unit to measure the mass of a large bag of flour. _____	kilogram
QMS 0112 VR	Name a metric unit that would be the best unit to measure the mass of a school bus. _____	tonne
QMS 0113 VR	Name a metric unit that would be the best unit to measure the mass of a coin. _____	gram

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Standard Units	Skills

Objective Given a unit of mass (mg, g, kg, t), the student will identify an object whose mass is commonly measured in that unit.

	Instrument	Correct Response
QMS 0201 CR	Provide the student with a set of standard units of mass. Say, "Find two objects in the classroom whose mass you would measure with grams. Find two more whose mass you would measure with kilograms."	Objects should be somewhat heavier than the standard unit they are paired with
QMS 0202 VM	Which one of the following is commonly measured in grams? (A) the mass of a large cabbage (B) the mass of a school desk (C) the mass of a loaded truck (D) the mass of a loaf of bread ____	D
QMS 0203 VM	Which one of the following is commonly measured in kilograms? (A) the mass of a bag of marshmallows (B) the mass of a package of tea (C) the mass of a load of bricks (D) the mass of a bag of sugar ____	D

	Instrument	Correct Response
QMS 0204 VM	Which one of the following is commonly measured in milligrams? (A) the mass of a serving of yogurt (B) the mass of a vitamin pill (C) the mass of a bottle of glue (D) the mass of a chocolate bar _____	B
QMS 0205 VR	Name something whose mass is commonly measured in kilograms. _____	
QMS 0206 VR	Name something whose mass is commonly measured in grams. _____	
QMS 0207 VR	Name something whose mass is commonly measured in tonnes. _____	

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Mass	Notation	Skills

Objective — Given a measurement of mass in one unit (mg, g, kg), the student will convert the measurement to another metric unit.

	Instrument	Correct Response
QMN 0101 VM	500 g = (A) 50.0 kg (B) 5.0 kg (C) 0.5 kg (D) 0.05 kg _____	C
QMN 0102 VM	1.5 t = (A) 15 kg (B) 150 kg (C) 1500 kg (D) 15 000 kg _____	C
QMN 0103 VM	50 mg = (A) 5 g (B) 0.5 g (C) 0.05 g (D) 0.005 g _____	C
QMN 0104 VR	Express 3200 g in kilograms. _____ kg	3.2

	Instrument	Correct Response
QMN 0105 VR	Express 0.32 kg in grams. _____ g	320
QMN 0106 VR	Express 0.6 g in milligrams. _____ mg	600
QMN 0107 VR	From the following list, circle a set of masses that will total a kilogram. 50 g, 50 g, 100 g, 100 g, 200 g, 200 g, 500 g	Any combination that adds to 1000 g
QMN 0108 VR	On one side of a balance we put 1.7 kg. From the following list, circle a set of masses which will exactly balance when put on the other side. 200 g, 200 g, 200 g, 500 g, 500 g, 50 g, 50 g, 10 g, 10 g, 5 g, 100 g, 100 g, 25 g.	Any combination that adds to 1700 g

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Time	Estimation	Skills

Objective — Given a specific period of time, the student will estimate that time period in standard units (h, min, s).

	Instrument	Correct Response
QTE 0101 CR	Have students work in pairs. One student is to have a watch that measures time in seconds. The other student is asked to open a book and then close it after estimates of 1 min, 30 s, 10 s. The first student records the actual time between opening and closing the book. Ask students to reverse positions and repeat the activity.	Record estimates over a period of time and assess improvement. Goals should be: 1 min - ± 10 s 30 s - ± 5 s 10 s - ± 2 s
QTE 0102 CR	Find your pulse. Count how many times your heart beats in what you estimate is one minute. Count again while timing yourself for one minute. How close was your estimate?	Pulse rate will vary but estimates of 1 min interval should improve with experience
QTE 0103 VM	The best estimate of the time it takes to count to twenty-five is (A) 15 s (B) 35 s (C) 45 s (D) 60 s ____	A

	Instrument	Correct Response
QTE 0104 VM	The best estimate of the time it takes to run one kilometre is (A) 1 min (B) 5 min (C) 10 min (D) 15 min _____	B
QTE 0105 VM	The best estimate for the time it takes to drive from Windsor to Montreal, a distance of 900 km, is (A) 2 h (B) 5 h (C) 10 h (D) 20 h _____	C
QTE 0106 VR	Estimate the time it takes to walk 1 km. _____	10-15 min
QTE 0107 CR	Provide student with a stack of note paper containing 30 sheets. Say, "Estimate the number of seconds it will take to count the sheets of paper in this pile. Time yourself. How close was your estimate?"	Outcomes will vary but estimates of time for completing a task should improve with experience

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Time	Standard Units	Skills

Objective — Given a standard unit of time (d, h, min, s), the student will identify activities whose times are commonly measured in that unit.

	Instrument	Correct Response
QTS 0101 VM	Which one of the following time periods is commonly measured in days? (A) the winning time for a 100 m dash (B) the working time for a normal day (C) the duration of Easter vacation (D) the duration of school recess ____	C
QTS 0102 VM	Which one of the following time periods is commonly measured in hours? (A) the length of a school period (B) the length of a school day (C) the length of a school vacation (D) the length of a school term ____	B
QTS 0103 VM	Which one of the following time periods is commonly measured only in minutes? (A) the flying time from Toronto to Vancouver (B) the working time during a normal week (C) the playing time for an audio cassette (D) the winning time for a marathon race ____	C

	Instrument	Correct Response
QTS 0104 VR	Name an activity whose completion is usually measured in hours. _____	
QTS 0105 VR	Name an activity whose completion is usually measured in minutes. _____	
QTS 0106 VR	Name an activity whose completion is usually measured in seconds. _____	

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Time	Standard Units	Understanding

Objective Given a certain period of time to be measured, the student will identify the most appropriate standard unit (d, h, min, s).

	Instrument	Correct Response
QTS 0201 VM	Which one of the following measurements could be the winning time for a horse race? (A) 3 s (B) 3 min (C) 3 h (D) 3 d _____	B
QTS 0202 VM	Which one of the following measurements could be the amount of time needed to cook a roast in an ordinary oven? (A) 3.5 s (B) 3.5 min (C) 3.5 h (D) 3.5 d _____	C
QTS 0203 VM	Which one of the following measurements could be the duration of a holiday? (A) 15 s (B) 15 min (C) 15 h (D) 15 d _____	D

	Instrument	Correct Response
QTS 0204 VR	Name the unit that is most often used to measure the length of a class period. _____	minute
QTS 0205 VR	Name the unit of time that is most often used to measure the length of a transcontinental train ride. _____	day
QTS 0206 VR	Name the unit that is most often used to measure the length of a working day. _____	hour

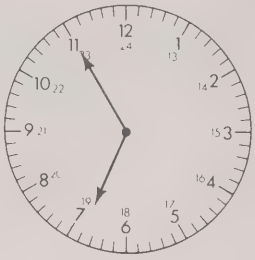
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Time	Measuring	Skills

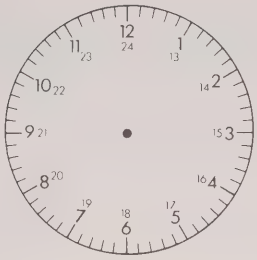
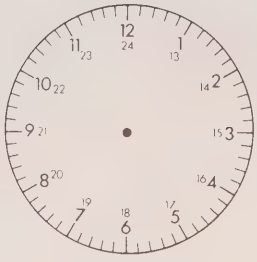
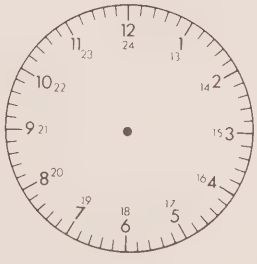
Objective — Given a specific time in hours, minutes, or seconds, the student will identify the corresponding reading on a clock (standard, 24 hour).

	Instrument	Correct Response
QTM 0101 CR	Use a clock with moveable hands. Give three different times (e.g., 03:45, 12:30, 04:20). Ask the student to set the clock to the time given, to nearest minute.	
QTM 0102 CR	Use a clock with moveable hands. Set different times on the clock. Ask, "What time will it be in 15 min, in 40 min, etc."	

	Instrument	Correct Response
QTM 0103 VM	Which one of the following clocks shows that the time is 3 o'clock? (A) (B) (C) (D) _____	D

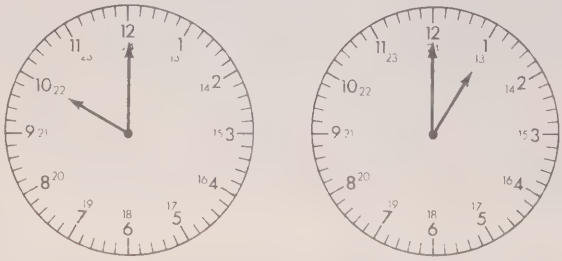
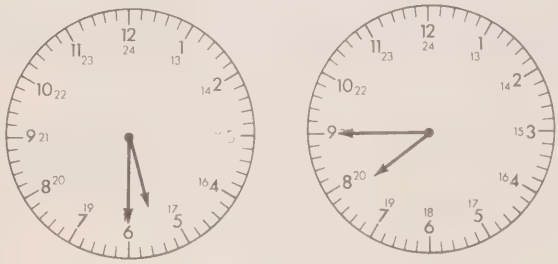
	Instrument	Correct Response
QTM 0104 VM	Which one of the following clocks shows that the time is 8:20? (A) (B) (C) (D) _____	C

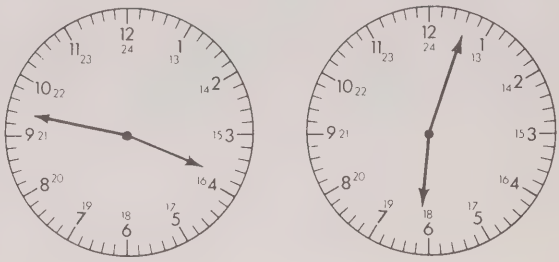
	Instrument	Correct Response
QTM 0105 VM	Which one of the following clocks shows that the time is 11:28? (A) (B)  (C) (D) _____	C

	Instrument	Correct Response
QTM 0106 VS	Draw in the hands to show a time of 2:00 p.m. 	
QTM 0107 VS	Draw in the hands to show a time of 9:30 a.m. 	
QTM 0108 VS	Draw in the hands to show a time of 3 minutes past noon. 	

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Time	Measuring	Skills

Objective — Given two clock readings (standard or digital), the student will identify the corresponding time change.

	Instrument	Correct Response
QTM 0201 DM	The clocks shown below show a time change of  (A) 1 h (B) 2 h (C) 3 h (D) 4 h ____	C
QTM 0202 DM	The clocks shown below show a time change of  (A) 1 h 45 min (B) 2 h 15 min (C) 2 h 30 min (D) 2 h 45 min ____	B

	Instrument	Correct Response
QTM 0203 DM	The clocks shown below show a time change of  (A) 2 h 16 min (B) 2 h 50 min (C) 3 h 16 min (D) 3 h 50 min _____	A
QTM 0204 DR	Name the time change shown by the given clocks. 7:00 9:05 _____	2 h 5 min
QTM 0205 DR	Name the time change shown by the given clocks. 3:06 00 4:20 00 _____	1 h 14 min
QTM 0206 DR	Name the time change shown by the given clocks. 4:00 21 4:31 42 _____	31 min 21 s

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Temperature	Estimation	Skills

Objective — Given that a specified temperature is to be measured, the student will estimate that temperature in degrees Celsius.

	Instrument	Correct Response
QPE 0101 CR	Say "Estimate the temperature of the air in (i) the classroom (ii) outside in the shade (iii) a refrigerator." Provide the student with a thermometer. Say "Now measure the actual temperatures. How close were you for each one?"	Assess improvement over time
QTE 0102 CR	Provide the student with two foam cups, a 1 L pot and a thermometer. Say, "Fill one cup with hot water from the tap and the other with cold water. Estimate the temperature of each. Check your estimate using the thermometer. What do you think the temperature will be if you mix the two? Check your answer with a thermometer."	Assess improvement over time
QTE 0103 VM	The best estimate for normal body temperature is (A) 15°C (B) 25°C (C) 35°C (D) 45°C ____	C

	Instrument	Correct Response
QPE 0104 VM	The best estimate of comfortable room temperature is (A) 10°C (B) 20°C (C) 30°C (D) 40°C _____	B
QPE 0105 VM	The best estimate for the temperature of freshly made hot chocolate is (A) 30°C (B) 60°C (C) 90°C (D) 120°C _____	C
QPE 0106 VR	Estimate the temperature of a very hot summer day. _____	30°C to 40°C
QPE 0107 VR	Estimate the temperature of a cool fall day. _____	5°C to 15°C
QPE 0108 VR	Estimate the temperature of a very cold winter day. _____	-20°C to -30°C

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Temperature	Estimation	Skills

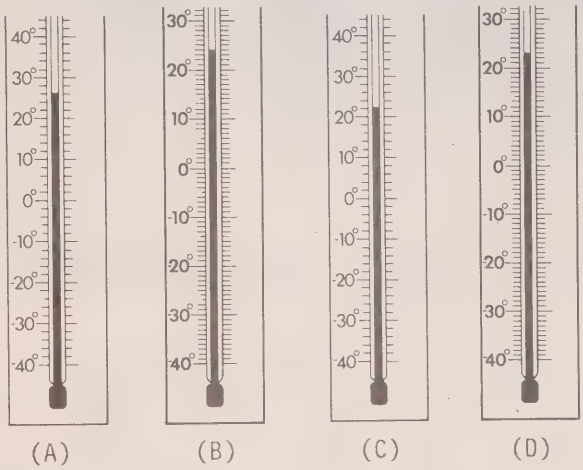
Objective Given a specific temperature in degrees Celsius, the student will identify an everyday situation for which that temperature is a reasonable estimate.

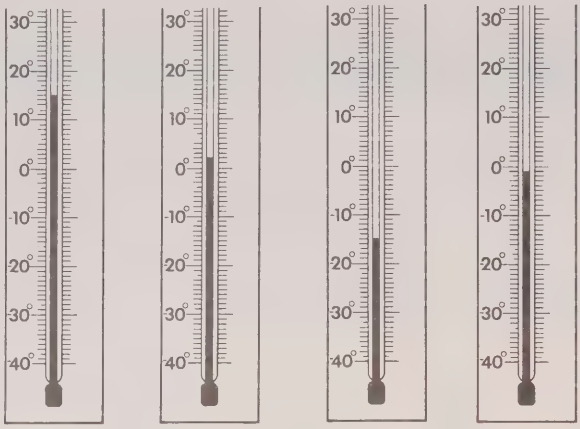
	Instrument	Correct Response
QPE0201 CR	Provide the student with a 1 L pot and a thermometer. Say "Using the hot and cold water taps, fill the pot with water that you think has a temperature of 20°C. Check your estimate with the thermometer."	Assess improvement over time
QPE 0202 VM	80°C could be the temperature of a (A) cup of milk from the fridge (B) cup of fruit juice (C) cup of hot soup (D) cup of boiling water _____	C
QPE 0203 VM	20°C could be the temperature of a (A) very cold winter day (B) pleasant spring day (C) cold fall day (D) very hot summer day _____	B
QPE 0204 VR	Describe something that has a temperature of about 40°C. _____	A warm bath, a bowl of porridge, a person with a fever, ...

	Instrument	Correct Response
QPE 0205 VR	Describe something that has a temperature of about 0°C. _____	Ice cream, ice cube, ...
QPE 0206 VR	Describe something that has a temperature of about -10°C. _____	A freezer, a winter day, ...

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Temperature	Measuring	Skills

Objective — Given a specific Celsius temperature, the student will identify the corresponding reading on a Celsius thermometer (liquid, dial, digital).

	Instrument	Correct Response
QPM 0101 DM	Which one of the following thermometers shows a temperature of 22°C.  (A) (B) (C) (D)	C

	Instrument	Correct Response
QPM 0102 DM	Which one of the following thermometers shows a temperature of -15°C?  (A) (B) (C) (D)	C
QPM 0103 DM	Which one of the following thermometers shows a temperature of about 23°C? (A) (B) (C) (D)	C

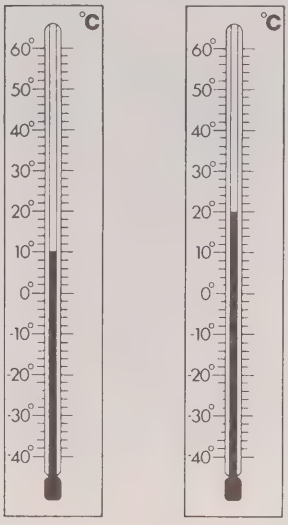
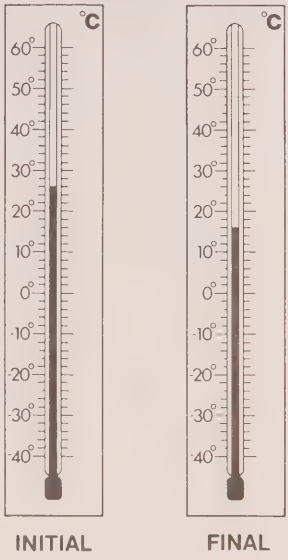
	Instrument	Correct Response
QPM 0104 VS	Shade in the given scale to show a temperature of 18°C. 	
QPM 0105 VS	Shade in the given scale to show a temperature of 28°C. 	

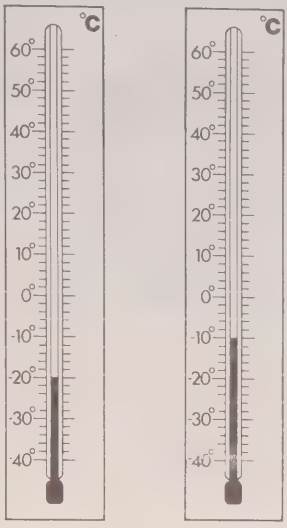
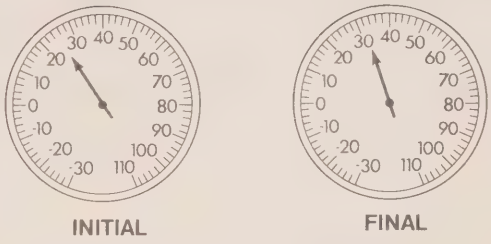
	Instrument	Correct Response
QPM 0106 VS	Mark the given scale to show a temperature of 17°C.	

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Temperature	Measuring	Skills

Objective — Given two readings on a Celsius thermometer (liquid, dial, digital), the student will identify the corresponding temperature change.

	Instrument	Correct Response
QPM 0201 CR	Provide the student with a thermometer. Say "What is the temperature of the air in this room? If you took the thermometer outside today, would you expect it to rise or fall and by how much? Check to find out."	Assess improvement over time
QPM 0202 CR	Provide the student with a thermometer and a pail of ice or snow. Say, "Find the temperature in the pail after (i) one minute (ii) five minutes (iii) one hour What did you discover?"	Temperature remains close to 0°C for a time, then increases to room temperature.

	Instrument	Correct Response
QPM 0203 DM	The thermometers shown below show  (A) a change of 0°C (B) a change of 10°C (C) a change of 20°C (D) a change of 30°C _____	B
QPM 0204 DM	The thermometers shown below show  (A) a rise of 40°C (B) a rise of 10°C (C) a fall of 10°C (D) a fall of 20°C _____	C

	Instrument	Correct Response
QPM 0205 DM	The thermometers shown below show  (A) a rise of 10°C (B) a rise of 5°C (C) a fall of 10°C (D) a fall of 30°C ____	A
QPM 0206 DR	Name the temperature change shown by the given thermometers.  _____	Rise of 7°C (±1°C)

	Instrument	Correct Response
QPM 0207 DR	Name the temperature change shown by the given thermometers. INITIAL FINAL	Fall of 12°C (±1°C)
QPM 0208 DR	Name the temperature change shown by the given thermometers. INITIAL FINAL	Rise of 8°C (±1°C)

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Quantification	Temperature	Measuring	Understanding

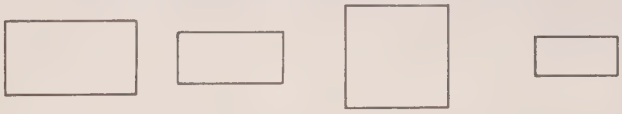
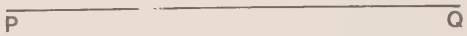
Objective Given a situation, the student will identify the temperature.

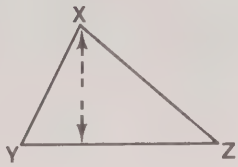
	Instrument	Correct Response
QPM 0301 CR	Provide the student with a thermometer. Say, "Find the temperature of hot tap water."	
QPM 0302 CR	Provide the student with a thermometer. Say, "Find the temperature of cold tap water."	
QPM 0303 VM	Water boils at (A) 80°C (B) 90°C (C) 100°C (D) 212°C ____	C
QPM 0304 VM	Water freezes at (A) -32°C (B) 0°C (C) 10°C (D) 32°C ____	B
QPM 0305 VM	Your normal body temperature is (A) 27.9°C (B) 37.9°C (C) 47.9°C (D) 98.8°C ____	B

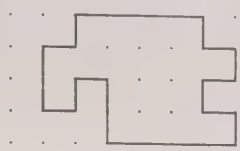
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Length	Comparison	Understanding

Objective Given one or more objects, their pictures, or names, the student will make length comparisons.

	Instrument	Correct Response
RLC 0101 CR	Work with a partner. Using a length of string find the distance around your wrist and the distance around your neck. Compare the two measurements.	Distance around neck approximately twice distance around wrist
RLC 0102 CR	Work with a partner. Using a length of string or a metric tape, measure your height and how far you can reach with both arms outstretched (fingertip to fingertip). Compare the two measurements.	Approximately equal
RLC 0103 DM	Which one of the following line segments has the greatest length? (A) _____ (B) _____ (C) _____ (D) _____ _____	A

	Instrument	Correct Response
RLC 0104 DM	Which one of the following figures has the greatest height? (A) (B) (C) (D) ____	D
RLC 0105 DM	Which one of the following rectangles has the greatest width? (A) (B) (C) (D)  ____	C
RLC 0106 DS	Draw a line segment that is shorter than PQ.  P Q	

	Instrument	Correct Response
RLC 0107 DS	Draw a triangle that has a greater height than triangle XYZ.  	
RLC 0108 DS	Draw a rectangle that has a shorter length than rectangle XYZW. 	
RLC 0109 VS	Use the dot paper to draw 3 different figures each having the same perimeter.	

	Instrument	Correct Response
RLC 0110 DS	Use the dot paper to draw 2 different figures each with the same perimeter as the given polygon. 	
RLC 0111 VM	Which one of the following objects has the shortest length? (A) a car (B) a bicycle (C) a truck (D) a train _____	B
RLC 0112 VM	Which one of the following objects has the greatest height? (A) a fully grown person (B) a fully grown corn plant (C) a fully grown white pine (D) a fully grown giraffe _____	C
RLC 0113 VM	Which one of the following objects has the smallest width? (A) a school classroom (B) a school bus (C) an ordinary doorway (D) a patio stone _____	D

	Instrument	Correct Response
RLC 0114 VR	Name an object that is longer than a pencil. _____	
RLC 0115 VR	Name an object that is wider than a basketball court. _____	
RLC 0116 VR	Name an object that is taller than a one-storey house. _____	

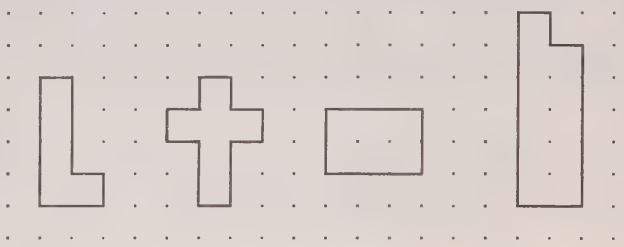
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Length	Comparison	Understanding

Objective Given one or more measurements, the student will make length comparisons.

	Instrument	Correct Response
RLC 0201 VM	Which one of the following measurements is the longest? (A) 3 cm (B) 3.1 cm (C) 3.01 cm (D) 3.001 cm _____	B
RLC 0202 VM	Which one of the following measurements is the shortest? (A) 0.2 km (B) 0.2 m (C) 0.2 dm (D) 0.2 cm _____	D
RLC 0203 VM	Which one of the following measurements has a different length than all the rest? (A) 5 km (B) 50 m (C) 500 dm (D) 5000 cm _____	A
RLC 0204 VR	Name a measurement that is longer than 3.75 m. _____	

	Instrument	Correct Response
RLC 0205 VR	Name a measurement in millimetres that is shorter than 6.2 cm. _____	
RLC 0206 VR	Name a measurement that has the same length as 73 mm but is in a different metric unit. _____	
RLC 0207 VM	Which set of measurements is listed in order of increasing length? (A) 3 m, 3.1 m, 3.01 m, 3.101 m (B) 3.01 m, 3 m, 3.1 m, 3.101 m (C) 3 m, 3.01 m, 3.1 m, 3.101 m (D) 3.01 m, 3.101 m, 3.1 m, 3 m _____	C
RLC 0208 VM	Which set of measurements is listed in order of increasing length? (A) 1 cm, 1 mm, 1 m, 1 dm (B) 1 mm, 1 cm, 1 m, 1 dm (C) 1 cm, 1 mm, 1 dm, 1 m (D) 1 mm, 1 cm, 1 dm, 1 m _____	D
RLC 0209 VR	List the following set of measurements in order of increasing length: 2 km, 2 cm, 2 m, 2 mm _____	2 mm, 2 cm, 2 m, 2 km

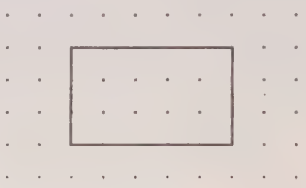
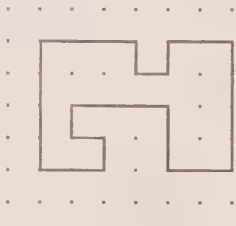
	Instrument	Correct Response
RLC 0210 VR	List the following set of measurements in order of increasing length: 4.01 km, 4.1 km, 4.001 km, 4.015 km _____	4.001 km, 4.01 km, 4.015 km, 4.1 km
RLC 0211 VM	Which one of the following statements is true? (A) 3 cm is less than 3 mm (B) 3 dm is less than 3 cm (C) 3 cm is greater than 3 mm (D) 3 cm is greater than 3 dm _____	C
RLC 0212 VM	Which one of the following statements is true? (A) 40 mm is greater than 5 cm (B) 40 mm is less than 2 cm (C) 40 mm is greater than 2 dm (D) 40 mm is less than 5 dm _____	D
RLC 0213 VR	Use one of the symbols <,>, or = to make a true statement. 7.2 cm _____ 7 cm	7.2 cm > 7 cm
RLC 0214 VR	Use one of the symbols <,>, or = to make a true statement. 2.5 m _____ 2.5 dm	2.5 m > 2.5 dm

	Instrument	Correct Response
RLC 0215 VR	Use one of the symbols <,>, or = to make a true statement. 30 cm _____ 3 dm	30 cm = 3 dm
RLC 0216 DM	Order these figures from largest to smallest according to their perimeters.  (A) (B) (C) (D) ____ ____ ____ ____	D, B, A, C

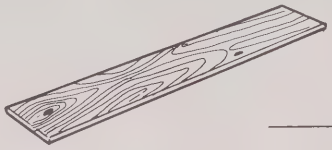
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Length	Problems	Applications

Objective Given a word problem involving length, the student will solve the problem.

	Instrument	Correct Response
RLP 0101 CR	Provide a metre stick or trundle wheel. Say, "Work with a partner to find the average length of your pace." (Explain that measuring one pace is not good enough because people tend to stretch it out). "Try measuring the distance travelled in 5 paces, in 10 paces. What is the average length of your pace? How many paces will you take in travelling 1 km? How does this compare with the number taken by your partner?"	
RLP 0102 VR	A baseball bat is 99 cm long. A skipping rope is 1.7 m long. (i) Which is longer? (ii) How much longer?	
	(i) _____	Skipping rope
	(ii) _____	71 cm
RLP 0103 VR	A stick is 1.23 m in length. A broom is 129.0 cm. (i) Which is longer? (ii) How much longer?	
	(i) _____	Broom
	(ii) _____	6 cm

	Instrument	Correct Response
RLP 0104 VR	A ball of cord is advertised to contain 150 m. Heather needs 49 m for her kite, Alison needs 43 m and Duncan needs 55 m. (i) Is there enough cord in the ball? (ii) How much more cord is needed or how much is left over? (i) _____ (ii) _____	Yes 3 m
RLP 0105 DR	Find the perimeter of this figure. Write a number sentence showing how you did it.  _____	(5 + 3)2 = 16 or 5 + 3 + 5 + 3 = 16 or ...
RLP 0106 VR	A ceiling moulding is to be put around a room 10 m x 6 m. How many metres of moulding must be purchased? _____	32 m
RLP 0107 VR	Find the perimeter of this figure.  _____	28 units

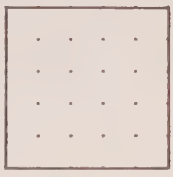
	Instrument	Correct Response
RLP 0108 VR	A hallway measuring 20 m x 4 m is to have its baseboard replaced. There are 8 doorways, each 1 m wide. How many metres of baseboard are needed? _____	40 m
RLP 0109 VR	A garden measuring 10 m x 20 m needs to be enclosed by fencing. Fence posts are to be placed every 2 m. How many fence posts are needed? _____	30
RLP 0110 VR	In a marching band the average step is 0.75 m long. If a band member takes 1560 steps during a performance, how far did the person walk? _____	1170 m
RLP 0111 VR	A piece of rope 15 m long is cut into 4 equal pieces. How long is each piece? _____	3.75 m or 375 cm
RLP 0112 VR	A stack of paper is 9 cm high. There are 1000 sheets in the pile. Calculate the thickness of 1 sheet. _____	0.009 cm or 0.09 mm

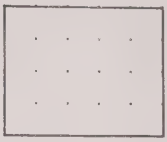
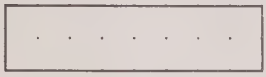
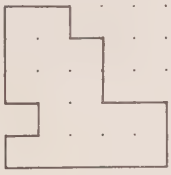
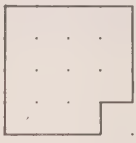
	Instrument	Correct Response
RLP 0113 DR	Saul plans to cut 4 identical shelves from a board that is 3.6 m in length. If each saw cut is 4 mm wide, what is the length of each shelf?  _____	89.7 cm or 897 mm
RLP 0114 VR	A stack of 1000 sheets of paper is 6.5 cm high. Calculate the thickness of 1 sheet of paper. _____	0.0065 cm or 0.065 mm or equivalent
RLP 0115 DR	Fine thread has been wound around a ruler 40 times as shown. Calculate the thickness of the thread. _____	0.5 mm
RLP 0116 VR	A hiker plans to walk 10 000 paces. If an average pace is 70 cm, how many kilometres will be travelled? _____	7

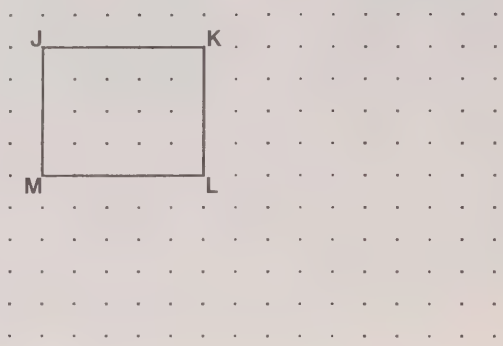
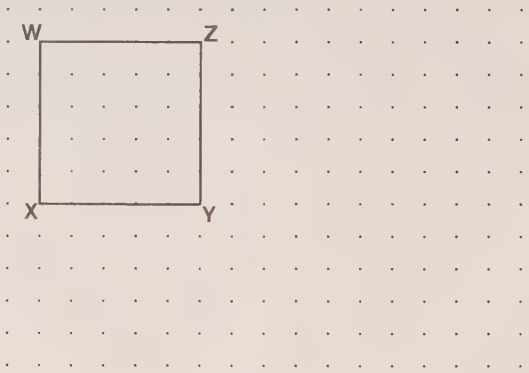
	Instrument	Correct Response
RLP 0117	A strand of human hair is 0.01 mm thick. How many times would you have to wind it around a ruler to cover 1 cm? _____	1 000

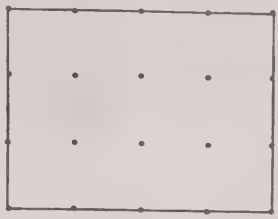
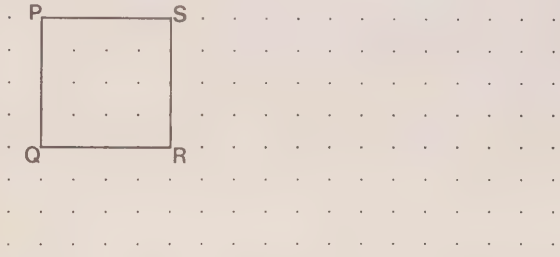
STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationship	Area	Comparison	Understanding

Objective — Given one or more objects, their pictures, or names, the student will make area comparisons.

	Instrument	Correct Response
RAC 0101 CR	Provide the student with a geoboard and elastics. Say, "Make two different rectangles having an area of 12 square units."	Should be different in length and width
RAC 0102 DM	Which one of the following squares has the greatest area? (A) (B)  (C) (D) ____	B

	Instrument	Correct Response
RAC 0103 DM	Which one of the following rectangles has the greatest area? (A) (B)  (C)  D) ____	D
RAC 0104 DM	Which one of the following figures has the greatest area? (A)  (B)  ____	A

	Instrument	Correct Response
RAC 0105 DS	Draw a rectangle that has a smaller area than JKLM. 	
RAC 0106 DS	Draw a rectangle that has a greater area than WXYZ. 	

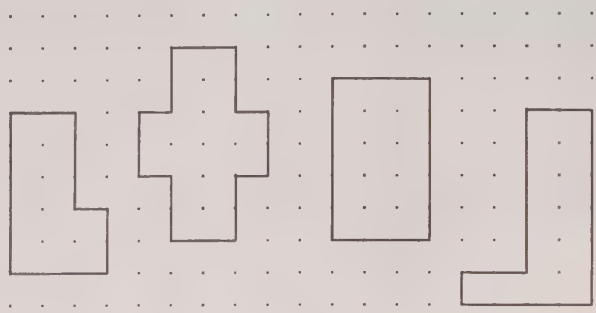
	Instrument	Correct Response
RAC 0107 DS	Draw a square that has an area 3 cm² smaller than EFGH. 	
RAC 0108 DS	Draw a rectangle that has an area 4 cm² greater than PQRS. 	
RAC 0109 VM	Which one of the following surfaces has the greatest area? (A) your classroom floor (B) a hockey rink (C) the roof of a shed (D) a volleyball court ____	B
RAC 0110 VM	Which one of the following has the largest area? (A) a playing card (B) a domino (C) a postage stamp (D) an eraser ____	A

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Area	Comparison	Skills

Objective Given one or more measurements, the student will make area comparisons.

	Instrument	Correct Response
RAC 0201 CR	Provide the student with a geoboard and elastics. Say, "Make a square having an area of 16 square units. How long is each side? Make another square with sides half the length. What is the area of this square? What would be the area of the square with sides double the length of your first square?"	4 units, 4 square units, 64 square units
RAC 0202 CR	Provide the student with a sheet of centimetre squared paper and a ruler. Say, "On the squared paper draw as many rectangles as you can having an area of 8 cm^2. What could be the length and width of a rectangle having an area of 9 cm^2?"	9 cm, 1 cm or 3 cm, 3 cm
RAC 0203 VM	Which one of the following areas is the largest? (A) 12 mm^2 (B) 12.5 mm^2 (C) 12.05 mm^2 (D) 12.055 mm^2 ____	B

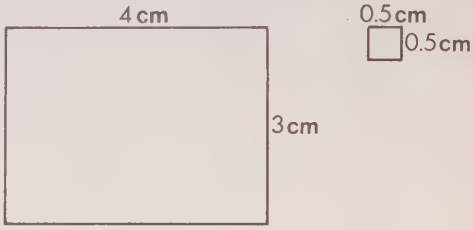
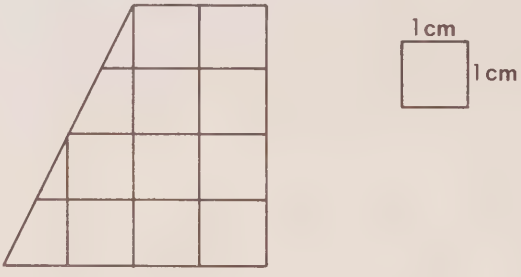
	Instrument	Correct Response
RAC 0204 VM	Which one of the following areas is the smallest? (A) 0.4 km^2 (B) 0.4 m^2 (C) 0.4 dm^2 (D) 0.4 ha _____	C
RAC 0205 VR	Name an area measurement using metric units that is larger than 6.15 m^2. _____	7 m^2 or ...
RAC 0206 VR	Name an area measurement in square decimetres that is smaller than 5.2 m^2. _____	5 dm^2 or ...
RAC 0207 VR	Name an area measurement that has the same size as 15 dm^2 but in a different metric unit. _____	1500 cm^2 or ...
RAC 0208 VR	Use one of the symbols <,>, or = to make a true statement. 5.6 m^2 _____ 560 dm^2	5.6 m^2 = 560 dm^2
RAC 0209 VR	Use one of the symbols <,>, or = to make a true statement. 2 ha _____ 200 m^2	2 ha = 200 m^2

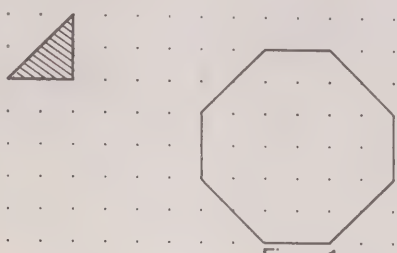
	Instrument	Correct Response
RAC 0210 DM	Order these figures from largest to smallest according to their areas.  (A) (B) (C) (D) ____ ____ ____ ____	B, C, D, A

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Area	Problems	Applications

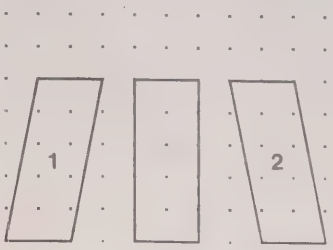
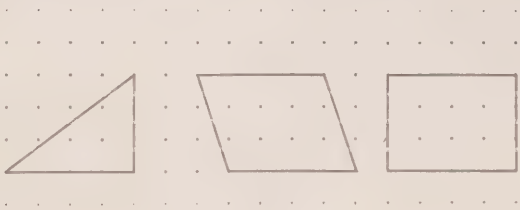
Objective Given a word problem involving area, the student will solve the problem.

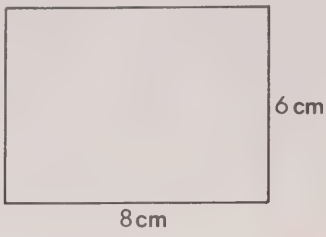
	Instrument	Correct Response
RAP 0201 CR	Students should work in pairs. Provide them with 2 sheets of centimetre-squared paper, water, paper towels. Say, "Today we are going to investigate how much mass each square centimetre of your foot supports. Using only the materials provided (you will have to take off one shoe and one sock unless you don't mind having a wet foot) calculate how many square centimetres of your foot actually touch the ground when you stand on it. You already know your mass. Find out the number of kilograms each square centimetre supports. Remember you have two feet."	
RAP 0202 CR	Provide each pair of students with a set of centicubes (65 or more), Say, "Sometimes it is important to know what the total surface area of a cube measures. I want you to build a series of cubes, increasing the length of each edge by 1 cm each time, until you have built all you can. Calculate the total surface area for each cube. Make a table to show your results. Use the pattern to calculate the surface area of area of 6 cm cube."	

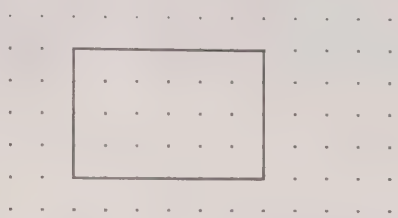
	Instrument	Correct Response
RAP 0203 CR	Provide metre sticks or metric tape measures. Choose two students to work on each wall of the classroom. Say, "The principal wants to know how much it will cost to paint the walls in our room. A painter will charge $8.00 for each square metre. He will not paint the windows, the chalkboard, the doors, or bulletin boards. Find out how much it will cost to paint the walls. Keep track of all your measurements and calculations so we can be sure your estimate is accurate."	
RAP 0204 DR	How many of the squares will fit into the rectangle?  _____	48
RAP 0205 DR	What is the area of Figure 1?  _____	12 cm^2

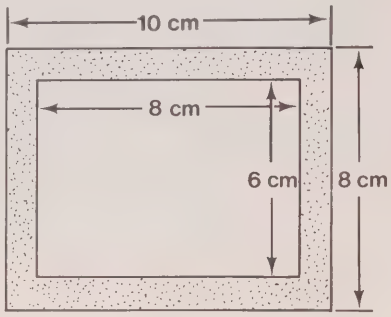
	Instrument	Correct Response
RAP 0206 DR	In the diagram the shaded triangle represents a unit of area. How many such units are in Figure 1?  Figure 1 _____	14
RAP 0207 VR	If the area of a rectangular rug is 20 m^2 and its length is 5 m, what is the width? _____	4 m
RAP 0208 VR	A gardener has enough grass seed to seed a rectangular lawn 8 m by 3 m. He uses it to to seed a rectangular lawn 6 m long. How wide will it be? _____	4 m
RAP 0209 VS	Use this dot paper to draw three different figures each having an area of 16 square units.	

	Instrument	Correct Response
RAP 0210 VS	Use this dot paper to draw three different figures each having an area of 9 square units.	
RAP 0211 VR	A rectangle measures 4 cm by 6 cm. Write a number sentence to show the area of one of the triangles formed by drawing a diagonal.	$\frac{1}{2}$ (4x6) = 12 or $\frac{4x6}{2}$ = 12
RAP 0212 VS	Use this dot paper to draw a triangle and a rectangle each having an area of 24 units.	

	Instrument	Correct Response
RAP 0213 DR	Find the areas of the rectangle and the two parallelograms.  Parallelogram #1 _____ Rectangle _____ Parallelogram #2 _____ Compare the areas. _____	10 square units or 2.5 cm^2 10 square units or 2.5 cm^2 10 square units or 2.5 cm^2 Equal
RAP 0214 DR	Find the areas of the rectangle, triangle and parallelogram.  _____ _____ _____ Compare the areas. _____	6 square units or 1.5 cm^2, 12 square units or 3 cm^2, 12 square units or 3 cm^2 Parallelogram and rectangle have same area, triangle has half the area of rectangle or parallelogram

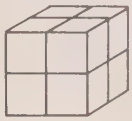
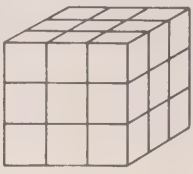
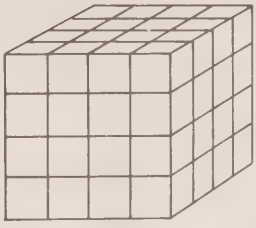
	Instrument	Correct Response
RAP 0215 DR	By what fraction do both the length and width of this rectangle have to be reduced to get an area of 12 cm^2?  _____	$\frac{1}{2}$
RAP 0216 VR	A rectangular piece of glass has an area of 120 cm^2. How big would the glass surface be if it was half its length and half its width? _____	30 cm^2

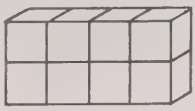
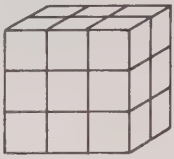
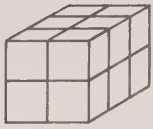
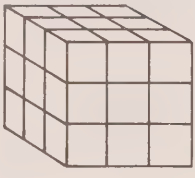
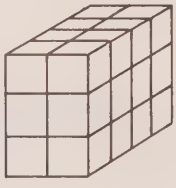
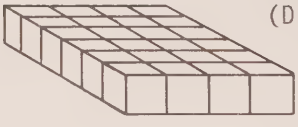
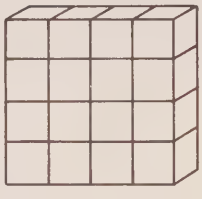
	Instrument	Correct Response
RAP 0217 DR	Use a ruler to divide this rectangle into two equal parts. (i) How many different ways can you do it?  (i) _____ What fraction of the original rectangle is each part? (ii) _____	Most likely response 4; some students will identify more than 4 $\frac{1}{2}$
RAP 0218 VR	A large one layer square birthday cake is to be made by combining 4 small cakes that measure 30 cm by 30 cm. What will be the area of the top of the large cake? _____	3600 cm^2
RAP 0219 VR	A roll of aluminum foil is 30 cm wide. How long a piece is needed to cover an area of 240 cm^2? _____	8 cm

	Instrument	Correct Response
RAP 0220 VR	Last year the skating rink at the park was 25 m wide and 40 m long. This year it will be the same width but the length will be shorter. The new area is 900 m^2. What is the new length? _____	36 m
RAP 0221 DR	How many square metres of outdoor carpeting are needed for the walkway around this pool?  _____	32 m^2
RAP 0222 VR	Jose measured the length of the chalkboard as 220 cm. Helen measured the width as 1.5 m. What is the area of the chalkboard? _____	3.3 m^2 or 33 000 cm^2

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Volume	Comparison	Understanding

Objective Given one or more objects, their pictures, or names, the student will make volume or capacity comparisons.

	Instrument	Correct Response
RVC 0101 CR	Provide the student with centicubes. Say, "Build two different objects each having the same volume."	
RVC 0102 DM	Which one of the following has the greatest volume? (A)  (B)  (C)  (D)	C

	Instrument	Correct Response
RVC 0103 DM	Which one of the following has the greatest volume? (A)  (B)  (C)  (D) _____	B
RVC 0104 DM	Which one of the following has the greatest volume? (A)  (B)  (C)  (D)  _____	A

	Instrument	Correct Response
RVC 0105 DM	Which one of the following containers has the greatest capacity? (A) (B) (C) (D) _____	C
RVC 0106 VM	Which one of the following objects has the smallest volume? (A) a mail box (B) a piano (C) a light bulb (D) a cement block _____	C
RVC 0107 VM	Which one of the following has the greatest volume? (A) a flashlight battery (B) a brick (C) a clothes cupboard (D) a window box _____	C
RVC 0108 VM	Which one of the following has the greatest capacity? (A) a kitchen sink (B) a bathtub (C) a washing machine (D) a garbage pail _____	B

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Volume	Comparison	Skills

Objective Given one or more measurements, the student will make volume or capacity comparisons.

	Instrument	Correct Response
RVC 0201 VM	Which one of the following volumes is the largest? (A) 5.2 cm^3 (B) 5.25 cm^3 (C) 5.025 cm^3 (D) 5.0255 cm^3 ____	B
RVC 0202 VM	Which one of the following volumes is the smallest? (A) 1.6 mm^3 (B) 1.6 cm^3 (C) 1.6 dm^3 (D) 1.6 m^3 ____	A
RVC 0203 VM	Which one of the following capacities is the largest? (A) 1 L (B) 750 mL (C) 1000 cm^3 (D) 1500 mL ____	D
RVC 0204 VR	Name a volume measurement using metric units that is larger than 2.9 m^3. _____	3 m^3 or ...

	Instrument	Correct Response
RVC 0205 VR	Name a volume measurement using metric units that is smaller than 0.15 cm^3. _____	0.14 cm^3 or ...
RVC 0206 VR	Name a measurement of capacity using metric units that is larger than 250 mL. _____	251 mL or ...

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Volume	Problems	Applications

Objective Given a word problem involving volume or capacity, the student will solve the problem.

	Instrument	Correct Response
RVP 0101 VR	Four containers have volumes of 42 cm^3, 23 cm^3, 30 cm^3, and 48 cm^3. What is the total volume of the containers? _____	143 cm^3
RVP 0102 VR	A warehouse has 3 spaces for rent. One space is 150 m^3, the second space is 98 m^3 and the third space is 102 m^3. What is the total volume? _____	350 m^3
RVP 0103 VR	A classroom has 3 boxes of 1-cm cubes on a shelf. The first box has 305 cubes, the second has 510 cubes, and the third has 445 cubes. How large a box would you need to store the cubes if it was completely filled? _____	1260 cm^3
RVP 0104 VR	Bertha brought a 1500 mL bottle of juice to school for a party. Morag and Ilsa each brought a 750 mL bottle of juice. How much juice did the three girls bring? _____	3000 mL or 3L

	Instrument	Correct Response
RVP 0105 VR	One room in a building is 158 m^3 and a second room is only 96 m^3. How much larger is the first room? _____	62 m^3
RVP 0106 VR	A large box holds 7058 cm^3. If 999 cm^3 is filled, how much space is left in the box? _____	6059 cm^3
RVP 0107 VR	If you put 758 cm^3 of sand into a cubic decimetre container, how many cubic centimetres of space would not be filled? _____	242 cm^3
RVP 0108 VR	Jacques bought a 1-L can of oil. He put 340 mL in the lawnmower. How much does he have left? _____	660 mL
RVP 0109 VR	A space of 3 dm^3 is filled with 1-cm cubes. Exactly 350 cubes are given away. How many cubes are left? _____	2650

	Instrument	Correct Response
RVP 0110 VR	A closet has a volume of 2 m^3. A merchant stores 750 dm^3 of boxes in the closet. How much space is left over? _____	1250 dm^3
RVP 0111 VR	A printer has 7 cartons of paper. Each carton holds 5 dm^3. What is the total volume of paper? _____	35 dm^3
RVP 0112 VR	Yuri's father brought home a case of 12 bottles of cola. Each bottle contains 750 mL. How much cola is in a case? _____	9000 mL or 9 L
RVP 0113 VR	A jeweller stores 24 boxes in a cupboard. Each box has a volume of 150 cm^3. How much space is used? _____	3600 cm^3
RVP 0114 VR	Sixteen box cars on a train each hold 85 m^3. What is the total volume of all the box cars? _____	1360 m^3

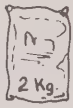
	Instrument	Correct Response
RVP 0115 VR	Greg has 12 500 plastic cubes, each with a volume of 1 cm^3. If he packed three-quarters of the cubes away, how many did he put away? _____	9375
RVP 0116 VR	One box can hold 8000 cm^3 but is only 0.75 full. The other can hold 13 000 cm^3 but is 0.5 full. Which box has more cubes in it? _____	13 000-cm^3 box
RVP 0117 VR	Marilyn's teacher bought a 1-L can of glue. How many small bottles each holding 125 mL can she fill? _____	8
RVP 0118 VR	How many 7-m^3 boxes can be stored in a warehouse compartment which has a volume of 84 m^3 if the compartment can be filled? _____	12
RVP 0119 VR	A cupboard has a space of 63 750 cm^3. How many 30-cm^3 boxes can be stored if the cupboard can be filled? _____	2125

	Instrument	Correct Response
RVP 0120 VR	Eighteen containers are stored in a space of 270 m^3. How big is each container? _____	15 m^3
RVP 0121 VR	An outboard motor needs a fuel mixture of 50 times as much gasoline as oil. If Joan puts 200 mL of oil in the tank, how much gasoline must she add? _____	10 000 mL or 10 L
RVP 0122 VR	Erika bought foam cups for a picnic. Each cup holds 190 mL. How many cups can she fill from four 1-L cans of apple juice? _____	21
RVP 0123 VR	Mrs. Laski wanted to buy some liquid detergent. A 1.5-L bottle of one brand was on sale for $2.99. A 2-L bottle of another brand cost $3.95. Which one was the best buy? _____	2-L bottle

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Mass	Comparison	Understanding

Objective Given one or more objects, their pictures, or names, the student will make mass comparisons.

	Instrument	Correct Response
RMC 0101 CR	Provide the student with a set of five objects with different masses (e.g. pair of scissors, flashlight battery, glue bottle, chalk brush, box of staples) and a balance. Say, "Arrange these objects in order from smallest to largest mass."	
RMC 0102 CR	Collect 4 objects from the classroom. Put them in order beginning with the object with the smallest mass.	
RMC 0103 VR	Order the following objects from those having the lowest mass to those having the highest mass. 1. garbage can 2. piece of chalk 3. text book 4. blackboard brush ____ ____ ____ ____	2, 4, 3, 1

	Instrument	Correct Response
RMC 0104 DM	Which one of the following sacks of potatoes has the greatest mass? (A) (B) (C) (D)  ____	C
RMC 0105 DM	Which one of the following objects has the least mass? (A) (B) (C) (D) ____	D

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Mass	Comparison	Skills

Objective Given one or more measurements, the student will make mass comparisons.

	Instrument	Correct Response
RMC 0201 VM	Which one of the following is the largest mass? (A) 2 kg (B) 2.1 kg (C) 2.01 kg (D) 2.001 kg ____	B
RMC 0202 VM	Which one of the following is the smallest mass? (A) 1.5 t (B) 1.5 kg (C) 1.5 g (D) 1.5 mg ____	D
RMC 0203 VM	Which one of the following is a different mass from the rest? (A) 0.001 t (B) 1 kg (C) 1000 g (D) 100 000 mg ____	D
RMC 0204 VR	Circle the lightest mass. 13.62 g, 136 g, 14.5 g	13.62 g

	Instrument	Correct Response
RMC 0205 VR	Name a metric measurement that is greater than 7.25 kg. _____	7.26 kg or ...
RMC 0206 VR	Name a metric measurement that is less than 3.4 kg. _____	3.3 kg or ...
RMC 0207 VR	Name a metric measurement that is equal to 1000 mg. _____	1 g
RMC 0208 VM	Which set of measurements is listed in order of increasing mass? (A) 2 kg, 2.1 kg, 2.01 kg, 2.101 kg (B) 2.01 kg, 2 kg, 2.1 kg, 2.101 kg (C) 2 kg, 2.01 kg, 2.1 kg, 2.101 kg (D) 2.01 kg, 2.101 kg, 2.1 kg, 2 kg ____	C
RMC 0209 VM	Which set of measurements is listed in order of decreasing mass? (A) 1 kg, 10 g, 100 g, 1000 kg (B) 10 g, 100 g, 1 kg, 1000 kg (C) 1000 kg, 1 kg, 100 g, 10 g (D) 1000 kg, 100 g, 10 g, 1 kg ____	C

	Instrument	Correct Response
RMC 0210 VM	Which set of measurements is listed in order of increasing mass? (A) 1 kg, 1 t, 1 g, 1 mg (B) 1 g, 1 t, 1 kg, 1 mg (C) 1 mg, 1 g, 1 kg, 1 t (D) 1 t, 1 kg, 1 g, 1 mg _____	C
RMC 0211 VR	Arrange the following set of measurements in order of increasing mass. 3.01 kg, 3.1 kg, 3 kg, 3.101 kg _____, _____, _____, _____	3 kg, 3.01 kg, 3.1 kg, 3.101 kg
RMC 0212 VR	Arrange these masses in order from heaviest to the lightest. 16.2 kg, 23 g, 40.6 g, 120.97 kg _____, _____, _____, _____	120.97 kg, 16.2 kg, 40.6 g, 23 g
RMC 0213 VR	Arrange the following set of measurements in order of decreasing mass. 100 t, 100 kg, 10 kg, 1 t _____, _____, _____, _____	100 t, 1 t, 100 kg, 10 kg
RMC 0214 VR	Arrange the following set of measurements in order of increasing mass. 1 g, 1 mg, 1 kg, 1 t _____, _____, _____, _____	1 mg, 1 g, 1 kg, 1 t

	Instrument	Correct Response
RMC 0215 VM	Which one of the following statements is true? (A) 2 g is less than 2 mg (B) 2 mg is less than 2 kg (C) 2 g is greater than 2 kg (D) 2 mg is greater than 2 g _____	B
RMC 0216 VM	Which one of the following statements is true? (A) 4 t is less than 4 kg (B) 4 g is less than 4 kg (C) 4 kg is greater than 4 t (D) 4 kg is less than 4 g _____	B
RMC 0217 VM	Which one of the following statements is true? (A) 1 t is less than 1 kg (B) 1 kg is less than 1 g (C) 1 mg is greater than 1 kg (D) 1 g is greater than 1 mg _____	D
RMC 0218 VR	Use one of these symbols > , < , or = to make a true statement. 6.07 kg _____ 6.70 kg	6.07 kg < 6.70 kg
RMC 0219 VR	Use one of these symbols > , < , or = to make a true statement. 250 g _____ 1 kg	250 g < 1 kg
RMC 0220 VR	Use one of these symbols > , < , or = to make a true statement. 3000 mg _____ 3 kg	3000 mg < 3 kg

	Instrument	Correct Response
RMC 0221 VR	Use one of these symbols > , < , or = to make a true statement. 14 g _____ 140 kg	14 g < 140 kg
RMC 0222 VR	Use one of these symbols > , < , or = to make a true statement. 0.326 kg _____ 326 g	0.326 kg = 326 g
RMC 0223 VR	Use one of these symbols > , < , or = to make a true statement. 2300 g _____ 23 kg	2300 g < 23 kg
RMC 0224 VR	Use one of these symbols > , < , or = to make a true statement. 14.6 kg _____ 396 g	14.6 kg > 396 g

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Mass	Problems	Applications

Objective Given a word problem involving mass, the student will solve the problem.

	Instrument	Correct Response
RMP 0101 VM	A hockey player has a mass of 84 kg. His equipment has a mass of 9 kg. When fully dressed for a game his total mass is (A) 84 kg (B) 93 kg (C) 95 kg (D) 105 kg _____	B
RMP 0102 VM	Tom loads 150 kg of sand and 75 kg of gravel into his truck. The total mass of his load is (A) 175 kg (B) 200 kg (C) 225 kg (D) 250 kg _____	C
RMP 0103 VM	Three people having masses of 120 kg, 100 kg and 80 kg are riding in an elevator. Their total mass is (A) 300 kg (B) 280 kg (C) 220 kg (D) 200 kg _____	A

	Instrument	Correct Response
RMP 0104 VM	A produce truck begins the day with a load of 4500 kg of vegetables. After making three deliveries of 1000 kg, 1500 kg, and 500 kg, the mass of vegetables left on the truck is (A) 1000 kg (B) 1500 kg (C) 2000 kg (D) 2500 kg _____	B
RMP 0205 VM	A grain elevator in Thunder Bay contains 50 000 t of wheat. During the week two loads of 25 000 t and 10 000 t are received. One load of 15 000 t is shipped out. The mass of wheat now in the elevator is (A) 20 000 t (B) 70 000 t (C) 80 000 t (D) 100 000 t _____	B
RMP 0206 VR	Four men have masses of 68 kg, 75 kg, 86 kg, and 71 kg. What is the total mass of the four men? _____	300 kg
RMP 0207 VR	Roger buys two bags of fertilizer, one having a mass of 40 kg, the other a mass of 20 kg. If he uses 10 kg for his flower bed, how much does he have left for his lawn? _____	50 kg

	Instrument	Correct Response
RMP 0208 VR	A vitamin pill has a mass of 150 mg. It contains 50 mg of vitamin B1, 40 mg of vitamin B2, and 15 mg of vitamin B3. The remainder is vitamin C. What is the mass of the vitamin C? _____	45 mg
RMP 0209 VR	Maria's mass was 91 kg. After dieting she lost a total of 12 kg. What is her mass now? _____	79 kg
RMP 0210 VR	A box of golf balls has a mass of 0.602 kg. Each golf ball has a mass of 0.046 kg. What is the mass of the box after 1 golf ball has been removed? _____	0.556 kg
RMP 0211 VM	Jethro shares 120 kg of venison equally with his three brothers. Each brother receives (A) 20 kg (B) 30 kg (C) 40 kg (D) 60 kg _____	B
RMP 0212 VM	Five quarters have a mass of 25 g. Five dimes have a mass of 10 g. How much heavier are the five quarters? (A) 3 g (B) 5 g (C) 15 g (D) 35 g _____	C

	Instrument	Correct Response
RMP 0213 VM	Jodi buys a case of instant coffee that contains four rows of three 200-g jars. The total mass of instant coffee purchased is (A) 600 g (B) 800 g (C) 1400 g (D) 2400 g _____	D
RMP 0214 VM	Paul buys three 120-g packages of mints and four 30-g packages of jelly beans. He shares his candy equally with 5 friends. Each share has a mass of (A) 30 g (B) 48 g (C) 80 g (D) 96 g _____	C
RMP0215 VM	A copper mine normally produces 2000 t of ore a day. If machinery breakdowns reduce the daily output by half, the daily production will be (A) 250 t (B) 500 t (C) 750 t (D) 1000 t _____	D
RMP 0216 VR	A box of telephone books has a mass of 36 kg. If each telephone book has a mass of 1.5 kg, how many telephone books are in the box? _____	24

	Instrument	Correct Response
RMP 0217 VR	A baby chick has a mass of 8 g when hatched. If its mass doubles every week, what will the mass of the chick be at the end of three weeks? _____	64 g
RMP 0218 VR	A truck and its load have a mass of 5 350 kg. If this is 350 kg more than twice the mass of the empty truck, what is the mass of the empty truck. _____	2500 kg
RMP 0219 VR	Which is the better buy? (1) 2 kg of soap flakes for $2.00 (2) 1.8 kg of soap flakes for $1.85 _____	2 kg for $2.00
RMP 0220 VR	In each 25 g of cereal there are the following amounts of these minerals and vitamins. Niacin . . . . . 1.3 mg Phosphorus . . . . . 84 mg Iron . . . . . 18 mg Riboflavin . . . . . 0.3 mg If you ate a 100 g serving of cereal, how many mg would you eat of: (1) Niacin? _____ (2) Iron? _____ (3) Riboflavin? _____	5.2 mg 72 mg 1.2 mg

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Time	Comparison	Skills

Objective Given one or more measurements, the student will make time comparisons.

	Instrument	Correct Response
RTC 0101 VM	Which one of the following represents the longest period of time? (A) 100 d (B) 10 d (C) 1.0 d (D) 0.1 d _____	A
RTC 0102 VM	Which one of the following represents the longest period of time? (A) 3 min (B) 3 s (C) 3 d (D) 3 h _____	C
RTC 0103 VM	Which one of the following represents the longest period of time? (A) 3600 s (B) 60 min (C) 1 h (D) 0.1 d _____	D
RTC 0104 VR	Name a period of time that is shorter than 15 s. _____	14 s, 13 s, ..

	Instrument	Correct Response
RTC 0105 VR	Name a period of time that is shorter than 35 min. _____	34 min, 33 min, 32 min, ...
RTC 0106 VR	Name a period of time that is shorter than 10 d. _____	9 d, 8 d, 7 d, ... or 9 d 23 h, ...
RTC 0107 VM	Which set of measurements is listed in order of increasing duration of time? (A) 100 h, 10 h, 1 h, 0.1 h (B) 10 h, 1 h, 0.1 h, 100 h (C) 1 h, 0.1 h, 100 h, 10 h (D) 0.1 h, 1 h, 10 h, 100 h _____	D
RTC 0108 VM	Which set of measurements is listed in order of increasing duration of time? (A) 1 h, 1 d, 1 s, 1 min (B) 1 min, 1 d, 1 h, 1 s (C) 1 d, 1 h, 1 min, 1 s (D) 1 s, 1 min, 1 h, 1 d _____	D
RTC 0109 VM	Which set of measurements is listed in order of increasing duration of time? (A) 2 h, 100 min, 1.5 h, 80 min (B) 1.5 h, 80 min, 2 h, 100 min (C) 80 min, 1.5 h, 100 min, 2 h (D) 100 min, 2 h, 80 min, 1.5 h _____	C

	Instrument	Correct Response
RTC 0110 VR	List the following set of measurements in order of decreasing duration of time. 30 s, 0.3 s, 3 s, 0.03 s _____, _____, _____, _____	30 s, 3 s, 0.3 s, 0.03 s
RTC 0111 VR	List the following set of measurements in order of decreasing duration of time. 10 h, 1 d, 18 h, 0.5 d _____, _____, _____, _____	1 d, 18 h, 0.5 d, 10 h
RTC 0112 VR	List the following set of measurements in order of decreasing duration of time. 5 min, 40 s, 0.5 min, 80 s _____, _____, _____, _____	5 min, 80 s, 40 s, 0.5 min
RTC 0113 VM	Which one of the following statements is true? (A) 4 s is a longer time than 4 min (B) 4 s is a longer time than 4 h (C) 4 min is a shorter time than 4 s (D) 4 min is a shorter time than 4 h _____	D
RTC 0114 VM	Which one of the following statements is true? (A) 3 min is a longer time than 3 h (B) 3 min is a longer time than 3 d (C) 3 h is a shorter time than 3 d (D) 3 h is a shorter time than 3 min _____	C

	Instrument	Correct Response
RTC 0115 VM	Which one of the following statements is true? (A) 5 h is a shorter time than 5 s (B) 5 h is a shorter time than 5 d (C) 5 s is a longer time than 5 h (D) 5 s is a longer time than 5 d _____	B
RTC 0116 VR	Use one of the symbols >, <, or = to make a true statement. 3.2 s _____ 3.02 s	3.2 s > 3.02 s
RTC 0117 VR	Use one of the symbols >, <, or = to make a true statement. 50 h _____ 2 d	50 h > 2 d
RTC 0118 VR	Use one of the symbols >, <, or = to make a true statement. 0.25 h _____ 900 s	0.25 h = 900 s

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Time	Problems	Applications

Objective Given a word problem involving time, the student will solve the problem.

	Instrument	Correct Response
RTP 0101 VM	Bill works 3 h 15 min on Friday and 6 h 45 min on Saturday. How long does he work altogether? (A) 9 h (B) 9h 30 min (C) 9 h 45 min (D) 10 h ____	D
RTP 0102 VM	Sheila works 8.5 d in January, 6 d in February, and 7.5 d in March. How many days does she work altogether? (A) 21 d (B) 21.5 d (C) 22 d (D) 22.5 d ____	C
RTP 0103 VM	During performance testing, a car took 7.5 s to go from 0 to 100 km/h, 4.5 s to go from 100 to 150 km/h, and 5.5 s to go from 150 to 200 km/h. How long did it take the car to go from 0 km/h to 200 km/h? (A) 16.5 s (B) 17 s (C) 17.5 s (D) 18 d ____	C

	Instrument	Correct Response
RTP 0104 VR	If Orca works 6 h 30 min on Saturday and 5 h 30 min on Sunday, how long does she work altogether? _____	12 h
RTP 0106 VR	Toni borrows $10 from her father on 20 June 1985. She repays the loan on 10 August 1985. How many days did she owe her father $10? _____	51 d
RTP 0107 VM	If Joanne gets to school at 8:45 a.m. and leaves for lunch at 12:15 p.m., how long has she been at school? (A) 3 h (B) 3 h 30 min (C) 4 h (D) 4 h 30 min _____	B
RTP 0108 VM	If the sun rises at 5:40 a.m. and sets at 6:20 p.m., how many hours of daylight are there? (A) 12 h (B) 12 h 20 min (C) 12 h 40 min (D) 13 h _____	C

	Instrument	Correct Response
RTP 0109 VM	If Dave starts work at 8:10 a.m., has lunch from 12:15 p.m. to 1:30 p.m. and leaves work at 5:40 p.m., how long does he actually work that day? (A) 8 h (B) 8 h 15 min (C) 8 h 30 min (D) 9 h ____	B
RTP 0110 VR	If Wendy starts a school project at 6:20 p.m. and finishes it at 9:40 p.m., how much time does she spend on the project? _____	3 h 20 min
RTP 0111 VR	If a race begins at 12:58:02 and finishes at 1:01:31, how much time was taken to complete the race? _____	3 min 29 s
RTP 0112 VR	If Zetta starts work at 8:20 a.m., has lunch from 12:30 p.m. to 1:30 p.m. and leaves work at 6:10 p.m., how long does she actually work that day? _____	8 h 50 min
RTP 0113 VM	If Jack takes four 15 min breaks during his work day, how much time does he spend on breaks altogether? (A) 15 min (B) 30 min (C) 45 min (D) 60 min ____	D

	Instrument	Correct Response
RTP 0114 VM	If Gillian works 7.5 h/d for 10 d, how many hours will she get paid for? (A) 17.5 (B) 35 (C) 52.5 (D) 75 _____	D
RTP 0115 VM	If a clock loses 1 s/h, how much time will it lose during the month of June? (A) 6 s (B) 12 s (C) 6 min (D) 12 min _____	D
RTP 0116 VR	There are eight 30 s commercials during each hour of television broadcasting. How much time is used for commercials during a 3 h movie? _____	720 s or 12 min
RTP 0117 VR	Stan works 3 h/d for 5.5 d. How much will he earn if he is paid $10/h? _____	$165
RTP 0118 VR	If a clock loses 6 s/h, how much time has it lost after one week? _____	1008 s or 16 min 48 s

	Instrument	Correct Response
RTP 0119 VM	A carpenter has 120 h of work to finish a project. How many hours must she work each day to complete the project in 15 d? (A) 4 (B) 6 (C) 8 (D) 10 _____	C
RTP 0120 VM	If a clock loses 120 min in 30 d, how much does it lose every hour? (A) 5 s (B) 10 s (C) 15 s (D) 20 s _____	B
RTP 0121 VM	If the three times for running a race are 11 min, 12 min, and 16 min, the average time is (A) 11 min (B) 13 min (C) 28 min (D) 39 min _____	B
RTP 0122 VM	A car travels 240 km from 2:00 p.m. till 5:00 p.m. How fast is the car travelling? (A) 40 km/h (B) 60 km/h (C) 80 km/h (D) 100 km/h _____	C
RTP 0123 VR	How long does it take a car travelling at 90 km/h to cover a distance of 450 km? _____	5 h

	Instrument	Correct Response
RTP 0124 VR	Fred has to take 5 mL of cough medicine once every two hours. If he begins taking it at 1:00 p.m., how much medicine will he have taken before going to bed at 9:15 p.m.? _____	25 mL
RTP 0125 VR	On every radio station a beep sounds once on the hour and twice on the half hour. How many beeps would you hear if you listened to the radio from just before noon until 14:10? _____	7

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Temperature	Comparison	Skills

Objective Given several temperatures in degrees Celsius, the student will compare them.

	Instrument	Correct Response
RPC 0101 VM	Which set of measurements is listed in order of decreasing temperature? (A) 20°C, 10°C, 40°C, 30°C (B) 30°C, 40°C, 10°C, 20°C (C) 10°C, 20°C, 30°C, 40°C (D) 40°C, 30°C, 20°C, 10°C ____	D
RPC 0102 VM	Which set of measurements is listed in order of decreasing temperature? (A) -10°C, 0°C, 10°C, 20°C (B) 20°C, -10°C, 10°C, 0°C (C) -10°C, 20°C, 0°C, 10°C (D) 20°C, 10°C, 0°C, -10°C ____	D
RPC 0103 VM	Which set of measurements is listed in order of decreasing temperature? (A) -20°C, -30°C, -40°C, -10°C (B) -40°C, -30°C, -20°C, -10°C (C) -10°C, -20°C, -30°C, -40°C (D) -30°C, -20°C, -40°C, -10°C ____	C
RPC 0104 VR	List the following set of measurements in order of decreasing temperature: 27°C, 10°C, 15°C, 8°C _____, _____, _____, _____	27°C, 15°C, 10°C, 8°C

	Instrument	Correct Response
RPC 0105 VR	List the following set of measurements in order of increasing temperature: -11°C, 10°C, 0°C, 20°C _____, _____, _____, _____	-11°C, 0°C, 10°C, 20°C
RPC 0106 VR	List the following set of measurements in order of increasing temperature: -50°C, -10°C, -30°C, -20°C _____, _____, _____, _____	-50°C, -30°C, -20°C, -10°C
RPC 0107 VM	Which of the following statements is true? (A) 10°C is a higher temperature than 20°C. (B) 20°C is a lower temperature than 10°C. (C) 10°C is a lower temperature than 20°C. (D) 20°C is the same temperature as 10°C. _____	C
RPC 0108 VM	Which of the following statements is true? (A) 0°C is a lower temperature than -10°C. (B) 0°C is a higher temperature than -10°C. (C) -10°C is a higher temperature than 0°C. (D) -10°C is the same temperature as 0°C. _____	B

	Instrument	Correct Response
RPC 0109 VM	Which of the following statements is true? (A) -10°C is a lower temperature than -20°C. (B) -10°C is the same temperature as -20°C. (C) -20°C is a higher temperature than -10°C. (D) -20°C is a lower temperature than -10°C. _____	D
RPC 0110 VR	Use one of the symbols <, >, or = to make a true statement. 50°C _____ 70°C	50°C < 70°C
RPC 0111 VR	Use one of the symbols <, >, or = to make a true statement. 0°C _____ 10°C	0°C < 10°C
RPC 0112 VR	Use one of the symbols <, >, or = to make a true statement. -10°C _____ 5°C	-10°C < 5°C

STRAND	SECTION	TOPIC	SUB-TOPIC	CATEGORY
Measurement	Relationships	Temperature	Problems	Applications

Objective — Given a word problem involving temperature, the student will solve the problem.

	Instrument	Correct Response
RPP 0101 VM	The present temperature is 18°C. If the temperature rises 3°C, the temperature will be (A) 6°C (B) 15°C (C) 21°C (D) 54°C _____	C
RPP 0102 VM	The present temperature is 24°C. If the temperature falls 3°C, the temperature will be (A) 8°C (B) 21°C (C) 27°C (D) 72°C _____	B
RPP 0103 VM	The present temperature is 24°C. If the temperature rises 4°C and then falls 6°C, the temperature will be (A) 34°C (B) 26°C (C) 22°C (D) 14°C _____	C

	Instrument	Correct Response
RPP 0104 VR	The present temperature is 16°C. Find the new temperature after a rise of 4°C. _____	20°C
RPP 0105 VR	If the temperature at 10:00 is 16°C and by noon it has increased by 9°C, what is the temperature? _____	25°C
RPP 0106 VR	The temperature at 13:30 was 29°C. The low for the day was 12°C. By how many degrees did the temperature increase? _____	17°C
RPP 0107 VR	The present temperature is 22°C. Find the new temperature after a fall of 4°C and a rise of 7°C. _____	25°C
RPP 0108 VR	After a rise of 6°C and a fall of 8°C the temperature is 25°C. Find the starting temperature. _____	27°C

	Instrument	Correct Response
RPP 0109 VM	If the temperature is rising at 3°C/h, the increase after 6 h is (A) 2°C (B) 3°C (C) 9°C (D) 18°C _____	D
RPP 0110 VM	If the temperature is falling at 2°C/h, how long will it take to fall 6°C? (A) 12 h (B) 8 h (C) 4 h (D) 3 h _____	D
RPP 0111 VR	The temperature at 09:00 is 15°C. If the temperature goes up 1.5°C every half hour until 12:00, what would the temperature be? _____	24°C
RPP 0112 VR	If the temperature is rising at 2°C/h, find the increase after 4 h. _____	8°C
RPP 0113 VR	If the temperature is rising at 3°C/h, how long will it take to rise 12°C? _____	4 h

	Instrument	Correct Response
RPP 0114 VR	If the temperature rises 16°C in 8 h, how much does it rise every hour? _____	2°C
RPP 0115 VM	The present temperature is 20°C. If the temperature falls 2°C/h for 3 h, the new temperature will be (A) 26°C (B) 25°C (C) 15°C (D) 14°C ____	D
RPP 0116 VM	The present temperature is 18°C. If the temperature rises 2°C/h for 4 h, the new temperature will be (A) 10°C (B) 12°C (C) 24°C (D) 26°C ____	D
RPP 0117 VM	The high temperatures for the last four days are 22°C, 20°C, 23°C and 25°C. The average high temperature is (A) 21.5°C (B) 22°C (C) 22.5°C (D) 23°C ____	C
RPP 0118 VR	The present temperature is 18°C. If the temperature rises 3°C/h for 2 h, find the new temperature. _____	24°C

	Instrument	Correct Response
RPP 0119 VR	The present temperature is 10°C. If the temperature falls 3°C/h for 4 h, find the new temperature. _____	-2°C
RPP 0120 VR	The low temperatures for the last three days are 16.5°C, 17°C and 14.5°C. Find the average low temperature. _____	16°C
RPP 0121 VR	The temperature at 07:45 is 15°C. If the temperature goes up 1.5°C every half hour until 10:45, what will the temperature be? _____	24°C
RPP 0122 VR	In Moosonee the temperature was 8°C and dropped to -3°C. In Perth the temperature fell from 15°C to 5°C. Which place had the greatest temperature change? _____	Moosonee

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